

SCIENTIFIC PROGRAMME

8th FORUM ON NEW MATERIALS

OPENING SESSION

WELCOME ADDRESSES

Plenary Lectures

F:PL1 Integrated Quantum Materials and Devices

R.M. WESTERVELT, Center for Integrated Quantum Materials, Harvard University, Cambridge, MA, USA

F:PL2 Ultraflexible and Stretchable Electronics for Microvolt Biosignal Monitoring Systems

TSUYOSHI SEKITANI, The Institute of Scientific and Industrial Research, Osaka University, Ibaraki, Osaka, Japan

F:PL3 Mesoscopic Photosystems for the Generation of Electricity and Fuels from Sunlight

M. GRAETZEL, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

SYMPOSIUM FA

MATERIALS ISSUES IN FLEXIBLE AND STRETCHABLE ELECTRONICS

Session FA-1

Materials and Fabrication Processes

FA-1:IL01 Material Challenges for Printed Electronics in the Microwave Domain

C. ARMIENTO, Alkim Akyurtlu University of Massachusetts, Lowell, MA, USA

FA-1:IL02 Soft and Flexible Bioelectronics

R.A. GREEN, J.A. GODING, Imperial College London, London, UK

FA-1:IL03 Mechanomaterials for Stretchable and Conformable Electronic Devices

XIAODONG CHEN, Innovative Centre for Flexible Devices (iFLEX), School of Materials Science and Engineering, Nanyang Technological University, Singapore

FA-1:IL04 Organic Bioelectronic Textiles in Health Monitoring Devices

E. ISMAILOVA, Department of Bioelectronics, Ecole Nationale Supérieure des Mines de Saint Etienne, CMP-EMSE, MOC, Gardanne, France

FA-1:IL05 Polymeric Solid-state Ionic Gate Dielectrics for Low-voltage Field-effect Transistors

YONG-YOUNG NOH, Department of Energy and Materials Engineering, Dongguk University, Seoul, South Korea; **YOONSEUK CHOI**, Department of Electronics, Hanbat National University, Daejeon, South Korea

FA-1:IL06 Self-organization of pi-extended Heteroacenes for Solution-processable Organic Field-effect Transistors

TATSUYA MORI, T. YASUDA, Kyushu University, Fukuoka, Japan

FA-1:IL07 Realizing Flexible High-performance Silver Interconnects on Thin and Ultrathin Substrates by Inkjet-printing and Innovative Laser Treatment

M. VINNICHENKO¹, D. MAKAROV², M. FRITSCH¹, T. VOITSEKHIVSKA², V. SAUCHUK¹, M. KUSNEZOFF¹, ¹Fraunhofer IKTS, Dresden, Germany; ²Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

FA-1:IL08 Semiconducting: Insulating Polymer Blends: Towards Flexible, Robust Organic Optoelectronic Devices

N. STINGELIN, Georgia Institute of Technology, Atlanta, GA, USA

FA-1:LO9 Designing Novel Polymer Systems with Enhanced Dielectric Response

V. BOBNAR, Condensed Matter Physics Department, Jozef Stefan Institute, Ljubljana, Slovenia; Y. BEERAN, S. THOMAS, Mahatma Gandhi University, International University Centre for Nanoscience and Nanotechnology, Kottayam, Kerala, India; Y. GROHENS, Université de Bretagne, Sud LIMATB Laboratory, Lorient, France; V. KOKOL, University of Maribor, Institute for Engineering Materials and Design, Maribor, Slovenia; Y. THAKUR, Q. ZHANG, Electrical Engineering Department and Materials Research Institute, The Pennsylvania State University, University Park, PA, USA

FA-1:L10 Highly Robust Textile Circuit Boards for Dynamic Applications

C. DILS, L. GERHOLD, M. HAUBENREISSER, M. VON KRSHIWOBLOZKI, C. KALLMAYER, Fraunhofer IZM, Berlin, Germany; R. VIEROTH, M. SCHNEIDER-RAMELOW, K.-D. LANG, Technical University, Berlin, Germany

FA-1:IL11 Rehealable and Recyclable Artificial e-skin

JIANLIANG XIAO, Department of Mechanical Engineering, University of Colorado Boulder, CO, USA

FA-1:L12 Freestanding Ultrathin and Ultraconformable PVF Capacitors

J. BARSOTTI, The Biorobotics Institute, Scuola Superiore Sant'Anna & Center for Micro-BioRobotics @SSSA, Istituto Italiano di Tecnologia, Pontedera, Italy; I. HIRATA*, M. CAIRONI, Center for Nano Science and Technology @PoliMI, Istituto Italiano di Tecnologia, Milano, Italy; F. GRECO**, V. MATTOLI, Center for Micro-BioRobotics @SSSA, Istituto Italiano di Tecnologia, Pontedera, Italy; *At present at Center for Micro-BioRobotics @SSSA, Istituto Italiano di Tecnologia, Pontedera, Italy; **At present at Institute of Solid State Physics, Graz University of Technology, Graz, Austria

FA-1:L13 Thin Functional Dielectric Elastomer for Stretchable Devices

D.M. OPRIS¹, S.J. DÜNKI^{1,2}, YEE SONG KO^{1,2}, E. PERJU^{1,3}, P. CASPARI^{1,2}, D. DAMJANOVIĆ², Y. SHEIMA¹, F.A. NÜESCH^{1,2}, ¹Swiss Federal Laboratories for Materials Science and Technology Empa, Dübendorf; ²Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland; ³"Petru Poni" Institute of Macromolecular Chemistry of Romanian Academy, Romania

Session FA-2

Device Physics, Mechanics and Design

FA-2:IL01 Mechanical Properties of Organic Semiconductors for Stretchable and Mechanically Robust Electronics

D.J. LIPOMI, Department of NanoEngineering, University of California, San Diego, La Jolla, CA, USA

FA-2:IL02 Mechanical Reliability of Advanced Thin Films

TAEK-SOO KIM, Department of Mechanical Engineering, KAIST, Daejeon, South Korea

FA-2:IL03 Design of Substrate with Spatially Distributed Stiffness for Stretchable Electronics

JIZHOU SONG, Department of Engineering Mechanics, Zhejiang University, Hangzhou, Zhejiang, China

FA-2:IL04 A Highly Sensitive Flexible Sensor Analog to Human Skin Via Air-assembled Motile Electronic Whiskers

J. REEDER, T. KANG, S. RAINS, W. VOIT, University of Texas at Dallas, Richardson, TX, USA

FA-2:IL05 Soft Platinum-silicone Coating for the Epidural Stimulation of the Spinal Cord

G. SCHIAVONE, S.P. LACOUR, LSBI, EPFL Campus Biotech, Laboratory for Soft Bioelectronic Interfaces, School of Engineering, Geneva, Switzerland

FA-2:IL06 Electronic and Thermoelectric Properties of High-performance Polymer Semiconductors and Conductors

M. KEMERINK, Complex Materials and Devices, Department of Physics, Chemistry and Biology (IFM), Linköping University, Sweden

FA-2:IL07 Organic Semiconducting Crystals as Flexible, Ultra-low Voltage, Ionizing Radiation Detectors

B. FRABONI, Department of Physics and Astronomy, University of Bologna, Bologna, Italy

Session FA-3

Applications of Flexible/Stretchable Electronics

FA-3:IL01 Ultrathin, Imperceptible Electronics

M. KALTENBRUNNER, Soft Electronics Laboratory, Linz Institute of Technology, Johannes Kepler University Linz, Austria

FA-3:L02 Stretchable, Organic Electrotactile Materials for Wearable Haptic Feedback Devices

D. RODRIGUEZ, C. CARPENTER, J. RAMIREZ, SIEW TING M. TAN, S.E. ROOT, M.D. RUSSELL, L.V. KAYSER, D.J. LIPOMI, Department of NanoEngineering, University of California, San Diego, La Jolla, CA, USA

FA-3:L03 Finite Element Models of Soft Energy Harvesters based on Piezoelectric Polymers

R. DENZER, Division of Solid Mechanics, Lund University, Lund, Sweden

FA-3:IL04 Wearable Strain Sensors and Power Generators

I.A. ANDERSON, Biomimetics Lab, Auckland Bioengineering Institute, University of Auckland and StretchSense Ltd., Rockfield Road, Penrose, Auckland, New Zealand

FA-3:L05 Metallic Nanoislands on Graphene and Machine Learning for Monitoring Swallowing Activity in Head and Neck Cancer Patients

J. RAMIREZ¹, D. RODRIGUEZ¹, FANG QIAO³, J. WARCHALL², B.C. MARIN¹, J. RYE¹, E. AKLILE¹, A.S.-C. CHIANG¹, P.P. MERCIER², CK CHENG³, K.A. HUTCHESON⁴, E. SHINN⁴, D.J. LIPOMI¹, ¹Dept. of NanoEngineering, University of California, San Diego, La Jolla, CA, USA; Dept. of Electrical and Computer Engineering, University of California, San Diego, La Jolla, CA, USA; Dept. of Computer Science and Engineering, University of California, San Diego, La Jolla, CA, USA; ⁴Dept. of Behavioral Sciences, The University of Texas M.D. Anderson Cancer Center, Unit 1330, Houston, TX, USA

FA-3:L06 Development of Lead-free Piezoelectric Ceramic Nanofiber Modules for Flexible Structural Health Monitoring Sensor Application

SANG HYUN JI, JI SUN YUN, Electronic Convergence Materials Division, Korea Institute of Ceramic Engineering and Technology, Jinju, South Korea

FA-3:IL07 System Design for Flexible All-organic Reflectance Oximeter

Y. KHAN, DONGGEON HAN, A. PIERRE, J. TING, XINGCHUN WANG, C.M. LOCHNER, **A.C. ARIAS**, Dept. of Electrical Engineering and Computer Sciences, University of California, Berkeley, CA, USA

FA-3:IL08 Temporary Tattoo Ink-jet Printed Multi-Electrode Array for Electrophysiology Applications

F. GRECO, Institute of Solid State Physics, Graz University of Technology, Austria

FA-3:L09 The Glass Transition Temperature as a Means of Kinesthetic Feedback

C.W. CARPENTER, SIEW TING M. TAN, D. RODRIGUEZ, K. SKELIL, D.J. LIPOMI, University of California, San Diego, Dept. of Nanoengineering, South Pasadena, CA, USA

FA-3:IL10 Wearable Electronic System Based on Stretchable Carbon Nanotube Electronics and Ultrathin Organic Light Emitting Diodes

JA HOON KOO^{1,2}, DAE-HYEONG KIM^{1,2,3}, ¹Center for Nanoparticle Research, Institute for Basic Science (IBS), Seoul, South Korea; ²Interdisciplinary Program for Bioengineering, Seoul National University, Seoul, South Korea; ³School of Chemical and Biological Engineering, Institute of Chemical Processes, Seoul National University, Seoul, South Korea

FA-3:IL11 Soft and Inert Composites and Devices for Neural Interfaces

K. TYBRANDT, Laboratory of Organic Electronics, Linköping University, Norrköping, Sweden

SYMPOSIUM FB

TOWARDS NEXT GENERATION SOLAR CELLS: EMERGING MATERIALS, PHENOMENA AND DEVICE ARCHITECTURES

Session FB-1

Thin-film photovoltaics

FB-1.1 Silicon thin films and multi-junction Si solar cells**FB-1.1:IL01 Optimal Atomic Structure of Amorphous Silicon Obtained from Density Functional Theory Calculations**

P. PEDERSEN¹, L. PIZZAGALLI², **H. JONSSON**¹, ¹Faculty of Physical Sciences and Science Institute, University of Iceland, Reykjavik, Iceland ²Dept. of Physics and Mechanics of Materials, Institut P¹, CNRS-Université de Poitiers UPR 3346, SP2MI, Futuroscope Chasseneuil Cedex, France

FB-1.1:IL02 Atomic Layer Deposited Nanolayers to Enhance Silicon Photovoltaics

E. KESSELS, Department of Applied Physics, Eindhoven University of Technology, Eindhoven, Netherlands

FB-1.2 CIGS (and related compounds) and CdTe solar cells**FB-1.2:IL01 CIGS Thin Film Solar Cells: Advancements and Opportunities for Flexible and Tandem Photovoltaic Devices with Perovskite**

S. PISONI, FAN FU, T. FEURER, E. AVANCINI, J. LOECKINGER, SHIRO NISHIWAKI, T. WEISS, R. CARRON, S. BUCHELER, **A.N. TIWARI**, Empa - Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland

FB-1.2:IL02 New Disruptive Design of CIGS(e) Solar Cells Based on Advanced Surface Techniques Structures and Layers used in Silicon Solar Technology

B. VERMANG et al., University of Hasselt and Imec, Diepenbeek, Belgium

FB-1.2:IL03 Combination of Heat-light Soaking and Light Soaking for Performance Improvement of Cu(In,Ga)(S,Se)₂ Solar Cell

JAKAPAN CHANTANA¹, TAKUYA KATO², HIROKI SUGIMOTO², TAKASHI MINEMOTO¹, ¹Department of Electrical and Electronic Engineering, Ritsumeikan University, Shiga, Japan; ²Atsugi Research Center, Solar Frontier K. K., Atsugi, Kanagawa, Japan

FB-1.2:IL04 Sprayed Non-doped and Ga-doped ZnO Films for CuInGaSe₂ Solar Cells

KENJI YOSHINO, University of Miyazaki, Miyazaki, Japan

FB-1.2:IL05 Interfaces in CdTe Thin-film Solar Cells

B.G. MENDIS, A.A. TAYLOR, Durham University, Durham, UK; J.D. MAJOR, K. DUROSE, University of Liverpool, UK

FB-1.2:IL06 Low-cost Thin Film Solar Cells for BIPV Applications

E. GILIOLI, IMEM-CNR, Parma, Italy

FB-1.2:IL07 Electronic and Chemical Structure of Interfaces in CIGS and CdTe Thin-film Solar Cells

C. HESKE, Institute for Photon Science and Synchrotron Radiation (IPS) and Institute for Chemical Technology and Polymer Chemistry (ITCP), Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen, Germany; Department of Chemistry and Biochemistry, University of Nevada, Las Vegas (UNLV), Las Vegas, NV, USA

FB-1.2:L08 Optimization of Pulsed Laser Deposition Parameters for the Growth of High-quality CuIn_{1-x}Ga_xSe₂ Thin Films

CH. NICOLAOU¹, A. ZACHARIA², G. ITSOS², J. GIAPINTZAKIS¹, ¹Department of Mechanical and Manufacturing Engineering, University of Cyprus, Nicosia, Cyprus; ²Experimental Condensed Matter Physics Lab, Department of Physics, University of Cyprus, Nicosia, Cyprus

FB-1.3 Kesterite and other novel materials/concepts for inorganic thin film PV

FB-1.3:IL01 Development of ZnSnP2 Solar Cells: A Novel Absorber Material

YOSHITARO NOSE, SHIGERU NAKATSUKA, Kyoto University, Kyoto, Japan, SHUNSUKE AKARI, JAKAPAN CHANTANA, TAKASHI MINEMOTO, Ritsumeikan University, Japan

FB-1.3:IL02 Development of Antimony Selenide Solar Cells by a Scalable Deposition Route

L.J. PHILLIPS¹, P.J. YATES¹, H. SHIEL¹, O.S. HUTTER¹, M. BIRKETT¹, S. MARIOTTI¹, C. SAVORY², K. DUROSE¹, D.O. SCANLON², T.D. VEAL¹, **J.D. MAJOR**¹, ¹Department of Physics, University of Liverpool, UK; ²Department of Chemistry, University College London, UK

FB-1.3:IL03 Kesterite Thin Film Solar Cells Prepared by Chemical Route
SHIGERU IKEDA¹, THI HIEP NGUYEN², TAKASHI HARADA², ¹Department of Chemistry, Konan University, Kobe, Japan, ²Research Center of Solar Energy Chemistry, Osaka University, Toyonaka, Japan

FB-1.3:IL04 Silicon Heterojunction with Organic Thin Layer (HOT) Solar Cells

HAJIME SHIRAI, RYO ISHIKAWA, TAKUYA MIURA, Saitama University, Saitama, Japan

Session FB-2 III-V Solar Cells

FB-2:IL01 High Efficiency Multi-junction Solar Cells for Concentrator Photovoltaics

G. TIMO¹, N. ARMANI, G. ABAGNALE, RSE, Piacenza, Italy

FB-2:IL02 III-V Compound Semiconductor Nano-epitaxial Structures for High-efficiency Multi-junction Solar Cells

MASAKAZU SUGIYAMA, Research Center for Advanced Science and Technology (RCAST), The University of Tokyo, Japan

FB-2:IL03 Efficient Solar Cells and Water Reduction with Nanowires
D. VAN DAM, YINGCHAO CUI, A. STANDING, S. ASSALI, LU GAO, M.A. VERHEIJEN, P.H.L. NOTTEN, J.E.M. HAVERKORT, E. HENSEN, **E.P.A.M. BAKKERS**, Eindhoven University of Technology, Eindhoven, The Netherlands

Session FB-3 Organic, Dye Sensitised and Nanoparticle Photovoltaics

FB-3:IL01 Design of Molecular Donor and Acceptor Materials for Organic Solar Cells

P. BLANCHARD, MOLTECH-Anjou, UMR CNRS 6200, University of Angers, Angers, France

FB-3:IL02 Phthalocyanine- and Subphthalocyanine-based Donor-Acceptor Ensembles: Synthesis, Structure, and Physicochemical Properties

G. BOTTARI, T. TORRES, Departamento de Química Orgánica, Universidad Autónoma de Madrid, Madrid, Spain & IMDEA Nanociencia, Madrid, Spain & Institute for Advanced Research in Chemical Sciences (IAChem), Madrid, Spain; **G. LAVARDA**, J. GUILLEME, B. BALLESTEROS, Departamento de Química Orgánica, Universidad Autónoma de Madrid, Madrid, Spain

FB-3:IL03 Improve the Photo-stability by Controlling the Chemical Structures of Photoactive Materials for Polymer Solar Cells

VU VAN DOAN^{1,2}, QUOC VIET HOANG^{1,2}, RASOOL SHAFKET^{1,2}, CHANG EUN SONG^{1,2}, **WON SUK SHIN**^{1,2}, ¹Energy Materials Research Center, Advanced Materials Division, Korea Research Institute of Chemical Technology (KRICT), Daejeon, South Korea; ²Department of Advanced Materials and Chemical Engineering, University of Science and Technology (UST), Daejeon, South Korea

FB-3:IL04 BHJ Solar Cell based on Porphyrins with low Energy Loss (< 0.6 eV) and high efficiency (> 9%)

M. VARTANIAN¹, R. SINGHAL², P. DE LA CRUZ¹, G.D. SHARMA³, **F. LANGA**¹, ¹Universidad de Castilla-La Mancha, Institute of Nanoscience, Nanotechnology and Molecular Materials (INAMOL), Toledo, Spain; ²Department of Physics, Malviya National Institute of Technology (MNIT) Jaipur (Raj.), India; ³Department of Physics, The LNM Institute of Information Technology (Deemed University), Rupa ki Nagal, Jamdoli, Jaipur (Raj.), India

FB-3:IL05 Enhanced Photovoltaic Performance of Polymer Solar Cells using Multi-functional Quantum-dots Monolayer

KYU SEUNG LEE, J.H. SHIM, H.I. LIM, C.H. LEE, D.I. SON, B. LIM, Institute of Advanced Composite Materials, Applied Quantum Composites Research Center, Korea Institute of Science and Technology (KIST), Jeonbuk, South Korea; School of Advanced Materials Science and Engineering, Sungkyunkwan University (SKKU), Suwon, South Korea

FB-3:IL06 Development of New Narrow Bandgap π -Conjugated Small Molecules for Organic Solar Cells

SEIICHI FURUKAWA, H. KOMIYAMA, T. YASUDA, Kyushu University, Fukuoka, Japan

FB-3:IL07 Design and Implementation of Metal-free Organic Dyes as Highly Efficient Sensitizers for DSSCs

V. PROMARAK, A. THANGTHONG, T. SUDYOADSUK, P. CHASING, T. CHAWANPUNYAWAT, Department of Materials Science and Engineering, School of Molecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology (VISTEC), Payupnai, Wangchan, Rayong, Thailand

Session FB-4 Multiple Energy Level Devices

FB-4:IL01 Two Step Photon Absorption in III-V Solar Cells

V. TASCO, A. PASSASEO, CNR-Nanotec, Nanotechnology Institute, Campus Ecotekne, Lecce, Italy; A. CRET¹, M. LOMASCOLO, IMM-CNR Institute for Microelectronic and Microsystems, Campus Ecotekne, Lecce, Italy

FB-4:IL02 Recent Advances in Intermediate Band Solar Cells

A. MARTI¹, J. VILLA, E. ANTOLÍN, P.G. LINARES, C. TABLERO, A. LUQUE, Instituto de Energía Solar, Universidad Politécnica de Madrid, Madrid, Spain; I. RAMIRO, ICFO-Institut de Ciències Fotòniques, Barcelona, Spain; E. LOPEZ, Fraunhofer-Institut für Solare Energiesysteme ISE Freiburg, Germany

Session FB-5 Excited State Enhanced Solar Cells

FB-5:IL01 Photothermoelectric Energy Harvesting and Light Detection in Heterostructure Nanowires

H. LINKE, NanoLund, Lund University, Lund, Sweden

FB-5:IL02 Nanowires for Tandem Junction Solar Cells

M.T. BORGSTRÖM, Solid State Physics, Lund University, Lund, Sweden

Focused Session FB-6 PEROVSKITE PHOTOVOLTAICS

Session FB-6.1 Material Synthesis and Processing

FB-6.1:IL01 Efficient Sulfur-based Hole Transporting Materials for Perovskite Solar Cells

N. MARTIN, Departamento de Química Orgánica, Facultad de Química, Universidad Complutense, Madrid, Spain; IMDEA-Nanoscience, Madrid, Spain

FB-6.1:IL02 Room-temperature Solution-processed High-quality Perovskite through the Formation of Nanostructured Intermediate

WALLACE C.H. CHOY, Department of Electrical and Electronic Engineering, The University of Hong Kong, Hong Kong, China

FB-6.1:IL03 Molecular Engineering of Hole-transporting Materials for Perovskite Solar Cells

A. MOLINA-ONTORIA¹, I. ZIMMERMANN², J. URIETA³, J. ARAGO⁴, E. ORTI⁴, M.K. NAZEERUDDIN², N. MARTÍN^{1,3}, ¹IMDEA-Nanoscience, Campus de Cantoblanco, Madrid, Spain; ²Ecole Polytechnique Fédérale de Lausanne, Sion, Switzerland; ³Department of Organic Chemistry, Faculty of Chemistry, University Complutense, Madrid, Spain; ⁴Instituto de Ciencia Molecular, Universidad de Valencia, Paterna, Spain

FB-6.1:L04 Understanding the Effect of Precursor Solution Aging in Triple-cation Lead Perovskite

P. BOONMONGKOLRAS, DAEHAN KIM, **BYUNGHAN SHIN**, Dept. of Materials Science and Engineering, Korea Advanced Institute of Science and Technology, Daejeon, South Korea

FB-6.1:L05 High-efficiency Near-infrared Enabled Planar Perovskite Solar Cells by Embedding Upconversion Nanocrystals

YAN-ZHEN ZHENG, XITAO LI, FANLI MENG, State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing, China

Session FB-6.2

Theoretical Modelling of Materials and Devices

FB-6.2:IL01 Device Physics of Perovskite Solar Cells

W. TRESS, EPFL, Lausanne, Switzerland

FB-6.2:IL02 Charge Carrier Diffusion and Trapping Models in Lead Halide Perovskites

HIROKI URATANI, **KOICHI YAMASHITA**, Department of Chemical System Engineering, Graduate School of Engineering, The University of Tokyo, Tokyo, Japan

FB-6.2:L03 The Outstanding Performance of Hybrid Perovskites Explained by Ab-initio Calculations

A. FILIPPETTI, Dipartimento di Fisica, Università di Cagliari, and CNR-IOM Cagliari, Monserrato, Italy

FB-6.2:L04 Influence of Point Defect on the Electronic Structure of CH₃NH₃PbI₃ Perovskite

G. GARCIA¹, P. PALACIOS², A. MONTERO-ALEJO³, E. MENENDEZ-PROUPIN³, J. C. CONESA⁴, **P. WAHNON**¹, ¹Instituto de Energía Solar and Dept. TFO, E.T.S.I. Telecomunicación, Universidad Politécnica de Madrid, Spain; ²Instituto de Energía Solar and Dept. FAIAN, E.T.S.I. Aeronáutica y del Espacio, Universidad Politécnica de Madrid, Spain; ³Departamento de Física, Facultad de Ciencias, Universidad de Chile, Santiago, Chile; ⁴Instituto de Catálisis y Petroleoquímica, CSIC, Madrid, Spain

Session FB-6.3

Material and Device Stability

FB-6.3:IL01 Novel Materials for Stable Perovskite Solar Cells

A. ABATE, Helmholtz-Zentrum Berlin, Berlin, Germany

FB-6.3:L02 How to Assess Operational Stability of Perovskite Solar Cells with Reversible Degradation?

M.V. KHENKIN¹, K.M. ANOOP¹, I. VISOLY-FISHER^{1,2}, Y. GALAGAN³, F. DI GIACOMO³, B. RAMESH PATIL⁴, G. SHERAFATIPOUR⁴, V. TURKOVIC⁴, M. MADSEN⁴, T. MERCKX⁵, G. UYTTERHOEVEN⁵, J.P. A. BASTOS^{5,6}, T. AERNOUITS⁵, F. BRUNETTI⁷, M. LIRA-CANTU⁸, **E.A. KATZ**^{1,2}, ¹Dept. of Solar Energy and Environmental Physics, Swiss Inst. for Dryland Environmental and Energy Research, J. Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Midreshet Ben-Gurion, Israel; ²Ilse Katz Institute for Nanoscale Science and Technology, Ben-Gurion University of the Negev, Beersheva, Israel; ³Holst Centre - Solliance, Eindhoven, the Netherlands; ⁴SDU NanoSYD, Mads Clausen Institute, University of Southern Denmark, Sønderborg, Denmark; ⁵IMEC - a partner in Solliance, Leuven, Belgium; ⁶Department Electrical Engineering, KU Leuven, Leuven, Belgium; ⁷CHOSE (Centre for Hybrid and Organic Solar Energy), Department of Electronic Engineering, University of Rome Tor Vergata, Rome, Italy; ⁸Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and The Barcelona Institute of Science and Technology, Campus UAB, Bellaterra, Barcelona, Spain

FB-6.3:IL03 The Emergence of Layered 2D Perovskites for Stable and High-efficiency Optoelectronic Devices

A.D. MOHITE, Los Alamos National Laboratory, Los Alamos, NM, USA

Session FB-6.4

Design of Lead-free New Materials

FB-6.4:IL01 Enhancement of Sn-perovskite Solar Cells from View Point of Hetero-interface Design and Crystal Defect Density

SHUZI HAYASE, Kyushu National Institute of Technology, Kitakyushu, Japan

FB-6.4:L02 Bismuth and Antimony-based Lead Free Double Perovskites in Solar Cells

M. PANTALER, C. FETTKEHHAUER, I. ANUSCA, D.C. LUPASCU, Institute for Materials Science, University of Duisburg-Essen, Essen, Germany

Session FB-6.5

Scale up, Module Development and Measurement Protocols

FB-6.5:IL01 Carbon Perovskite Solar Cells from Laboratory to Factory

T. WATSON, SPECIFIC Swansea University, Swansea, UK

FB-6.5:IL02 Towards a Reliable Measurement Protocol for Perovskite Solar Cells

L. SCHMIDT-MENDE, University of Konstanz, Constance, Germany

FB-6.5:IL03 Lab to Fab: Technical, Manufacturing, Environmental and Cost Challenges for Commercial Scaling of Silicon Perovskite Tandem Solar Cells

C. CASE, E. CROSSLAND, L. MIRANDA, S. HOOPER, Oxford PV, Centre for Innovation and Enterprise, Oxford, UK

SYMPOSIUM FC

HYDROGEN PRODUCTION AND STORAGE

Session FC-1

Hydrogen Production

FC-1.1 Photoelectrochemical and thermochemical H₂ production**FC-1.1:IL01 New Materials and Concepts for Photocatalytic and Photoelectrochemical H₂ Production**

G. MUL, KAI HAN, YUXI GUO, K. WENDERICH, A. BELTRAM*, I. SIRETANU*, B. MEI, F. MUGELE, University of Twente, Faculty of Science and Technology PCS & PCF* groups, Enschede, The Netherlands

FC-1.1:IL02 Solution-processed Photocathode for Direct Solar Water Reduction

K. SIVULA, Institute of Chemical Sciences and Engineering Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

FC-1.1:IL03 Photoelectrochemical Water Splitting Devices

W.A. SMITH, D. VERMAAS, **B. DAM**, TU Delft, Netherlands

FC-1.1:IL04 Solar Redox Cycles for Splitting H₂O and CO₂: Status & Perspectives

R. MICHALSKY, A. STEINFELD, ETH Zürich, Department of Mechanical and Process Engineering, Zürich, Switzerland

FC-1.1:L05 3D-printed Porous Ceria Structures for Solar Thermochemical Redox Splitting of H₂O and CO₂

S. ACKERMANN, M. HOES, D. THEILER, P. FURLER, A. STEINFELD, ETH Zurich, Department of Mechanical and Process Engineering, Zurich, Switzerland

FC-1.2 Photobiological and photo-bio-mimetic H₂ production**FC-1.2:IL01 Bio Solar Cells for Solar Energy Conversion with High Yield**

H.J.M. DE GROOT, Leiden Institute of Chemistry, Leiden University, Leiden, The Netherlands

FC-1.2:IL02 Hybrid Materials for Photobiological Hydrogen Production

A. ANTONUCCI, N. SCHUERGERS, **A.A. BOGHOSSIAN**, Ecole Polytechnique Federale de Lausanne (EPFL), Lausanne, Switzerland

FC-1.2:IL03 Photochemical Production of Hydrogen by Enzyme Biohybrids

P.W. KING, K.A. BROWN, D.W. MULDER, M.W. RATZLOFF, C.E. LUBNER, National Renewable Energy Laboratory, Golden, CO USA; M. WILKER, J. UTTERBACK, H. HAMBY, G. DUKOVIC, University of Colorado, Boulder, CO, USA

FC-1.2:IL04 Water Oxidation Catalysts and a Turned Hydrogenase for Solar Hydrogen Production

S. STYRING, Molecular Biomimetics, Department of Chemistry, Angström, Uppsala University, Uppsala, Sweden

FC-1.3 Biomass/waste reforming

FC-1.3:IL01 Catalytic Power-to-Gas Technologies for Storing Hydrogen with Biomass

O. KROECHER, F. VOGEL, T. SCHILDHAUER, Paul Scherrer Institute, Villigen PSI, Switzerland

FC-1.3:IL02 Hydrogen Production from Biobased Compounds on Smart Ni Based Catalysts

L. JALOWIECKI-DUHAMEL, Univ. Lille, CNRS, Centrale Lille, ENSC, Univ. Artois, UMR 8181-UCCS-Unité de Catalyse et Chimie du Solide, Lille, France

FC-1.3:IL03 Mixed electronic- and Protonic-conducting Composites for Hydrogen Separation Ceramic Membranes

Y.N. BESPALKO, V.A. SADYKOV, P.I. SKRYABIN, A.V. KRASNOV, E.M. SADOVSKAYA, N.F. EREMEEV, Boreskov Institute of Catalysis, Novosibirsk, Russia; N.F. UVAROV, A.S. ULIHIN, Institute of Solid State Chemistry and Mechanochemistry, Novosibirsk, Russia

FC-1.4 Electrolysis from renewable energy

FC-1.4:IL01 Methane Enriched Gas Produced via Co-electrolysis of H₂O and CO₂ with a Solid Oxide Cell Operating at Intermediate Temperatures

M. LO FARO, S. TROCINO, S.C. ZIGNANI, A.S. ARICO', Institute of Advanced Energy Technologies (ITAE) of the Italian National Research Council (CNR), Messina, Italy

FC-1.4:IL02 CVD Graphene Growth for Alkaline Electrolysis Application

D. ION-EBRASU¹, S. ENACHE¹, A. ENACHE¹, E. CARCADEA¹, A. SOARE¹, JIE SUN², K. PETROV³, ¹National Institute for Cyogenics and Isotopic Technologies ICSI-Rm. Valcea, Romania; ²Department of Microtechnology and Nanoscience Chalmers University of Technology, Sweden; ³Acad. Evgeni Budevski Institute of Electrochemistry and Energy Systems, Bulgarian Academy of Sciences, Sofia, Bulgaria

Session FC-2

Hydrogen Storage

FC-2.1 Metal hydrides

FC-2.1:IL01 Metallic Nanoparticles in Hydrogen Storage and Conversion
N. PATELLI, M. CALIZZI¹, **L. PASQUINI**, Department of Physics and Astronomy, University of Bologna, Bologna, Italy; ¹Present address: Institut des Sciences et Ingénierie Chimiques, EPFL, Lausanne, Switzerland

FC-2.1:IL02 Hydrogen Storage in Individual Nanoparticles

A. BALDI, DIFFER - Dutch Institute for Fundamental Energy Research, Eindhoven, Netherlands

FC-2.1:IL03 Hydrogen Sorption Properties and Aqueous Corrosion Mechanisms of Sm₂Ni₇-yMny Intermetallics

N. MADERN, V. CHARBONNIER, J. MONNIER, J. ZHANG, M. LATROCHE Université Paris-Est, ICMPE (UMR 7182) CNRS-UPEC, Thiais, France

FC-2.1:IL04 Influence of Composition and Stoichiometry on the Hydrogenation Properties of Phase Intergrowth Alloys

M. LATROCHE, N. MADERN, J. MONNIER, JUNXIAN ZHANG, Université Paris Est, ICMPE, CNRS-UPEC, Thiais, France

FC-2.1:IL05 Microstructure and Hydrogen Storage Properties of Ti₁V_{0.9}Cr_{1.1} alloy with addition of x wt.% Zr (x= 0, 2, 4, 8 and 12)

S. SLEIMAN, **J. HUOT**, Hydrogen Research Institute, Université du Québec à Trois-Rivières, Trois-Rivières, Québec, Canada

FC-2.1:IL06 Mg₂FeH₆ for Hydrogen Storage and Lithium Batteries

A. PAOLONE, **O. PALUMBO**, CNR-ISC, U.O.S. La Sapienza, Roma, Italy; F. TREQUATRINI, Dipartimento di Fisica, Sapienza Università di Roma, Roma, Italy; P. REALE, ENEA - Centro Ricerche Casaccia, Roma, Italy; S. BRUTTI, Dipartimento di Scienze, Università della Basilicata, Potenza, Italy

FC-2.2 Complex hydrides

FC-2.2:IL01 Borohydrides-beyond Hydrogen Storage

P. JENA, Physics Department, Virginia Commonwealth University, Richmond, VA, USA

FC-2.2:IL02 Stability of Complex Hydrides

HEENA YANG, A. ZUETTEL, LMER, ISIC, SB, École polytechnique fédérale de Lausanne (EPFL) Valais/Wallis, Energypolis, Sion, Switzerland; Empa Materials Science and Technology, Dübendorf, Switzerland

FC-2.2:IL03 Mesoporous Carbons for the Nano-confinement of Hydrogen Storage Materials

R. JANOT, Laboratoire de Réactivité et Chimie des Solides (LRCS), UMR 7314 CNRS, Amiens, France

FC-2.2:IL04 Mg(BH₄)₂ : Synthesis, Nano-confinement and Catalysis

D. CLEMENCON, J.-N. CHOTARD, R. JANOT, Laboratoire de Réactivité et Chimie des Solides (LRCS), UMR 7314 CNRS, Université de Picardie Jules Verne, Amiens, France

FC-2.2:IL05 Thermodynamic Stability of Multi-cation Complex Hydrides

E.M. DEMATTEIS, M.G. POLETTI, M. BARICCO, University of Turin & NIS, Torino, Italy; A. SANTORU, C. PISTIDDA, M. DORNHEIM, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany

FC-2.2:IL06 Metal Borohydrides and Derivatives - Synthesis, Structure and Properties

T.R. JENSEN, iNANO and Chemistry Department, Aarhus University, Aarhus, Denmark

FC-2.2:IL07 Nanoconfined Complex Metal Hydrides for Hydrogen and Ammonia Storage and Catalysis

P. NGENE, P.E. DE JONGH, Inorganic Chemistry and Catalysis, Debye Institute for Nanomaterials Science, Utrecht University, the Netherlands

FC-2.2:IL08 Physisorption in Porous Mg(BH₄)₂

Y. FILINCHUK, Institute of Condensed Matter and Nanosciences, Université Catholique de Louvain, Louvain-la-neuve, Belgium

FC-2.3 Chemical hydrides

FC-2.3:IL01 Borohydride-water Based Chemical Hydrogen Carriers for On-board Hydrogen Storage

U.B. DEMIRCI, University of Montpellier IEM, UMR5635, CNRS-ENSCM-UM, Montpellier, France

FC-2.3:IL02 Ammonia - an Effective Zero-carbon Chemical Energy Store

W.I.F. DAVID^{1,2}, J.W. MAKEPEACE², T.J. WOOD¹, ¹Rutherford Appleton Laboratory, UK; ²Inorganic Chemistry Laboratory, Oxford, UK

FC-2.3:IL03 Chemical Hydrides as Precursors for the Growth of 2D Materials

F. LEARDINI, Departamento de Física de Materiales, Universidad Autónoma de Madrid, Madrid, Spain

FC-2.4 Physisorption of hydrogen on high surface area adsorbents

FC-2.4:IL01 H₂ Sorption in Composite Materials Based on Metal-organic Hybrid Frameworks

P.A. SZILAGYI, Queen Mary University of London, London, UK

FC-2.4:IL02 Carbon Monoliths for Hydrogen Storage Systems

M. KUNOWSKY, Universidad de Alicante, Alicante, Spain; AIJU, Technological Institute for Children's Products and Leisure, Ibi, Spain

FC-2.4:IL03 Gravimetric and Volumetric Hydrogen Storage Capacity in Metal-organic Frameworks

M. HIRSCHER, M. SCHLICHTENMAYER, R. BALDERAS-XICOHTÉNCATL, Max Planck Institute for Intelligent Systems, Stuttgart, Germany

FC-2.4:IL04 Composites of Multiwalled Carbon Nanotubes: Preparation, Characterization and Hydrogen Storage

S.U. RATHER, Chemical and Materials Engineering Department, King Abdulaziz University, Jeddah, Saudi Arabia

FC-2.5 CO₂ reduction with hydrogen to synthetic hydrocarbons

FC-2.5:IL01 First-principles Design of Porous Catalysts for Combined CO₂ Capture and Conversion

J.K. JOHNSON, L. LI, University of Pittsburgh, Pittsburgh, PA, USA; J. YE, University of Minnesota, Minneapolis, MN, USA

FC-2.5:IL02 Storage of Renewable Energy by Reduction of CO₂ with Hydrogen

A. ZUETTEL, HEENA YANG, LMER, ISIC, SB, École Polytechnique Fédérale de Lausanne (EPFL) Valais/Wallis, Energypolis, Sion, Switzerland, Empa Materials Science and Technology, Dübendorf, Switzerland

FC-2.6 Theoretical modelling

FC-2.6:IL01 Proton Transfer through the Bulk and Near Surface Catalysis in Nickel Oxides

M. CASPARY TOROKER, Department of Materials Science and Engineering, Technion - Israel Institute of Technology, Technion City, Israel

FC-2.6:IL02 Theoretical Analysis of Alkali Metal and Magnesium Cluso-Boranes

A.E. MANIADAKI, Z. LODZIANA, Institute of Nuclear Physics - PAS, Kraków, Poland

FC-2.7 Storage testing, leak detection and safety issues

FC-2.7:IL01 Scaled-up Materials Synthesis and Testing of Hydrogen Storage Tanks based on Nanostructured Hydrides

M. DORNHEIM, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany

FC-2.7:IL02 Safety Models for Hydrogen Systems

V. MOLKOV, Hydrogen Safety Engineering and Research Centre (HySAFER), Ulster University, Newtownabbey, Northern Ireland, UK

FC-2.7:IL03 Nanocluster-based Hydrogen Gas Sensors (CuO/WO₃) Prepared by Advanced Magnetron Sputtering Techniques

S. HAVIAR, J. CAPEK, University of West Bohemia, Faculty of Applied Sciences, NTIS and Department of Physics, Plzen, Czech Republic

FD-1:L07 High-nickel Layered Oxide Cathodes for Next-generation Lithium-ion Batteries

A. MANTHIRAM, Materials Science and Engineering Program and Texas Materials Institute, The University of Texas at Austin, Austin, TX, USA

FD-1:L08 High-temperature Reactivity of Li₇La₃Zr₂O₁₂-based Garnets with Cathode Active Materials

V. TARNOPOLSKIY, O. HAJNDL, S. CHOMETTE, P. AZAIS, Commissariat à l'Energie Atomique et aux Energies Alternatives, Grenoble, France; **M. CHAKIR**, Renault, France

FD-1:IL09 Electrochemical Properties of Highly Concentrated Aqueous Na-ion Battery

SHIGETO OKADA, RYO SAKAMOTO, KOSUKE NAKAMOTO, AYUKO KITAJOU, DAIKI MURAKAMI, HARUKA HIRAI, MASARU TANAKA, Institute for Materials Chemistry and Engineering, Kyushu University, Kasuga, Fukuoka, Japan

FD-1:IL10 Layered Oxide Electrode Materials for Sodium-ion Batteries

C. DELMAS, J. YOSHIDA, B. MORTERMARD, L. VITOUX, M. GUIGNARD, D. CARLIER, ICMCB, Pessac France; J. YOSHIDA, Toyota Motor Europe NV/SA, Zaventem, Belgium

FD-1:L11 TEM and Modeling Reactions between Li or Na and Layer Materials

C.B. CARTER, JIN WANG, S. TRIPATHI, M. JANISH, A. DONGARE, Department of Materials Science & Engineering, University of Connecticut, Storrs, CT, USA

FD-1:IL12 Enabling High Performance Energy Storage with Redox Electrolytes using Nanoporous Carbon

V. PRESSER, INM - Leibniz Institute for New Materials & Saarland University, Saarbrücken, Germany

FD-1:IL13 When does the Operation of a Battery Become Environmentally Positive?

K.-H. PETTINGER, University of Applied Sciences Landshut, Germany; WINNY DONG, Californian Polytechnical State University Pomona, USA

FD-1:IL14 New Polyanionic Electrodes for Secondary Batteries: Few Case Studies

P. BARPANDA, Indian Institute of Science, Bangalore, India

FD-1:IL15 Singlet Oxygen in Non-aqueous Battery Chemistries

N. MAHNE, L. SCHAFZAHL, E. MOURAD, Y. PETIT, B. SCHAFZAHL, C. SLUGOVIC, S. BORISOV, **S.A. FREUNBERGER**, Graz University of Technology, Graz, Austria; O. FONTAINE, University of Montpellier, France; D. KRAMER, University of Southampton, UK

FD-1:IL16 New Developments in Three-dimensional Microbatteries

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FD-1:IL17 Liquid and Solid State NMR Investigations of Low MW Polyether and Non-polyether Polymer Electrolytes for Supercapacitor and Battery Applications

M. GOBET, JING PENG, S. MUNOZ, D. MORALES, **S.G. GREENBAUM**, Hunter College of CUNY, New York, NY, USA; L. CARBONE, J. HASSOUN, University of Ferrara, Ferrara, Italy; R. RUTHER, J. NANDA, Oak Ridge National Laboratory, Oak Ridge, TN, USA; M. ZIMMERMAN, R. LEISING, Ionic Materials, Inc. Woburn, MA, USA

FD-1:L18 Polymeric Electrode Materials for Organic Batteries

A. LEX-BALDUCCI, S. MÜNCH, C. FRIEBE, R. BURGESS, M.D. HAGER, U.S. SCHUBERT, Laboratory of Organic and Macromolecular Chemistry (IOMC), Friedrich Schiller University Jena, Jena, Germany; Center for Energy and Environmental Chemistry Jena (CEEC Jena), Friedrich Schiller University Jena, Jena, Germany

FD-1:IL19 Challenging the Fabrication of Ultra-thick Electrodes for Higher Energy Density Batteries

L. ZOLIN, W. PORCHER, CEA Grenoble - Liten, Grenoble, France; J. GAUBICHER, D. GUYOMARD, **B. LESTRIEZ**, IMN CNRS/University of Nantes, Nantes, France

FD-1:IL20 Ions, Electrons, and Phonons: On the Movement of Charge through Solids

B.C. MELOT, Department of Chemistry, University of Southern California, Los Angeles, CA, USA

FD-1:IL21 Ionic Liquid-based Electrolytes for Safe Lithium-ion Batteries

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SYMPOSIUM FD

**MATERIALS DEMANDS TOWARDS NEW
GENERATION ELECTROCHEMICAL
ENERGY STORAGE SYSTEMS**

Session FD-1
Batteries

FD-1:IL01 Advances in Na-ion Batteries

T. ROJO, Department of Inorganic Chemistry, Faculty of Science and Technology, University of the Basque Country (UPV/EHU), Bilbao, Spain; and CIC energiGUNE, Parque Tecnológico de Álava, Miñano, Spain

FD-1:IL02 Materials for Advanced Lithium and Lithium-ion Batteries for NASA's Future Missions

R. BUGGA, M. SMART, W. WEST, E. BRANDON, R. EWELL, R. SURAMPUDI, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

FD-1:L03 MgH₂-TiH₂ Nanocomposites as a Conversion Material for Conventional or Solid State Li-ion Battery Anodes

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FD-1:IL04 Complex Hydrides as Electrolytes for Lithium-ion Batteries

D. GREGORY, WestCHEM, School of Chemistry, University of Glasgow, Glasgow, UK

FD-1:L05 Li Insertion into Li₄Ti₅O₁₂ Spinel Prepared by Low Temperature Solid State Route: Charge Capability vs Surface Area

M. ZUKALOVA, L. KAVAN, J. HEYROVSKY Institute of Physical Chemistry, CAS, Prague, Czech Republic; M. FABIAN, Institute of Geotechnics, SAS, Košice, Slovak Republic; M. KLEMENTOVA, Institute of Physics of CAS, Prague, Czech Republic; M. SENNA, Faculty of Science and Technology, Keio University, Yokohama, Japan

FD-1:IL06 Aluminum Batteries: Sustainable Alternative to Lithium-ion Systems

G.A. ELIA, Technische Universität Berlin, Research Center of Microperipheric Technologies, Berlin, Germany

Session FD-2 Supercapacitors

FD-2:IL01 Cost-effective and High-capacity Spinel Pseudocapacitive Oxides

NAE-LIH WU, M. ABDOLLAHIFAR, Y.C. LIN, Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan

FD-2:IL02 Environmentally Friendly Materials for Supercapacitors

A. VARZI, S. PASSERINI, Karlsruhe Institute of Technology (KIT) - Helmholtz Institute Ulm (HIU), Ulm, Germany

FD-2:IL03 3D-printing Electrodes for Electrical Energy Storage

M. WORSLEY, Lawrence Livermore National Laboratory, Livermore, CA, USA

FD-2:IL04 Buffered Solutions as New Electrolytes for Aqueous Supercapacitors

WATARU SUGIMOTO, SHO MAKINO, DAI MOCHIZUKI, Shinshu University, Faculty of Textile Science and Technology, Ueda, Japan

FD-2:IL05 Novel Electrolytes for Supercapacitors

A. BALDUCCI, L. HENNING HESS, C. SCHÜTTER, J. KRUMMACHER, Friedrich-Schiller-University Jena, Institute for Technical Chemistry and Environmental Chemistry, Center for Energy and Environmental Chemistry, Jena (CEEC Jena), Jena, Germany

Session FD-3 Application Engineering

FD-3:IL01 Atmospheric Pressure Spatial Atomic Layer Deposition of Thin Films for All-solid-state Batteries

E. BALDER, Y. CREYGHTON, L. HAVERKATE, D. HERMES, **F. ROOZEBOOM**, M. TULODZIECKI, S. UNNIKRISSHANN, TNO-Holst Centre, Eindhoven, The Netherlands

FD-3:IL02 Materials Engineering Challenges for Viable Li-S Battery Electrodes and Cells

S. TRABESINGER, Electrochemistry Laboratory, Paul Scherrer Institute, Villigen PSI, Switzerland

FD-3:IL03 Economic and Ecological Sustainability Analysis of Batteries for Stationary Applications

M. WEIL, M. BAUMANN, KIT/ITAS, Karlsruhe, Germany; J. PETERS, KIT/ HIU, Ulm, Germany

SYMPOSIUM FE FUEL CELLS: MATERIALS AND TECHNOLOGY CHALLENGES

Session FE-1 Solid Oxide Fuel Cells (SOFCs)

FE-1:IL01 Development and In-situ Characterization of Fast Ion Conductors for SOFCs

S. SKINNER, Imperial College London, London, UK

FE-1:IL02 Architecturally Designed La₂-xPr_xNiO₄+δ Cathodes for SOFCs

E. DJURADO, N.I. KHAMIDY, R.K. SHARMA, Institute of Engineering Univ. Grenoble Alpes, LEPMI, Grenoble, France

FE-1:IL03 Perovskite Electrodes for SOFCs Powered by Biogas

E. DI BARTOLOMEO, University of Rome Tor Vergata, Department of Chemical Science and Technologies, Rome, Italy

FE-1:IL04 Metal Supported Fuel Cells: Improved Electrochemical Performance by Improved Processing

M. BRAM^{1,2}, F. THALER^{1,2}, D.UDOMSILP^{1,2}, C. BISCHOF¹, A.K. OPITZ^{1,3}, ¹Christian Doppler Laboratory for Interfaces in Electrochemical Energy Converters; ²Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research - Materials Synthesis and Processing (IEK-1), Jülich, Germany; ³Vienna University of Technology, Institute of Chemical Technologies and Analytics, Vienna, Austria

FE-1:L05 In situ Imaging & Spectroscopy of Oxygen Exchange Reactions on Ceria-based Catalysts

E.L. LAWRENCE, P.A. CROZIER, Arizona State University, Tempe, AZ, USA

FE-1:L06 Analysis of Microstructural Change of Electrodes during Discharge Operation of Solid Oxide Fuel Cells

KOICHI EGUCHI, HIROKI MUROYAMA, TOSHIKI MATSUI, Department of Energy and Hydrocarbon Chemistry, Graduate School of Engineering, Kyoto University, Kyoto, Japan

FE-1:L07 Elucidating the Grain Boundary Conductivity Distribution by Correlating Local Composition and Character

W.J. BOWMAN, Laboratory for Electrochemical Interfaces, MIT, Cambridge, MA, USA; A.D. DARBAL, AppFive LLC, Tempe, AZ, USA; P.A. CROZIER, School for Engineering of Matter, Transport and Energy, Arizona State University, Tempe, AZ, USA

FE-1:L08 Investigating the Redox Properties of Novel Material Structures for Solid Oxide Fuel Cell Electrodes Using Raman Spectroscopy

R.C. MAHER, L.F. COHEN, The Blackett Laboratory, Imperial College London, London, UK; G. KERHERVE, D.J. PAYNE, Department of Materials, Imperial College London, London, UK; X. YUE, P.A. CONNOR, J. IRVINE, University of St Andrews, School of Chemistry, St Andrews, Fife, Scotland; R.I. TOMOV, R.V. KUMAR, B.A. GLOWACKI, Department of Materials Science & Metallurgy, University of Cambridge, Cambridge, UK

FE-1:L09 Direct Utilisation of Dry Ethanol in Solid Oxide Fuel Cells Using a Perovskite Anode Modified with Ni-alloy @ FeO_x Core-shell Nanoparticles

M. LO FARO, S.C. ZIGNANI, S. TROCINO, S. MAISANO, **A.S. ARICO**¹, Institute of Advanced Energy Technologies (ITAE) - Italian National Research Council (CNR), Messina, Italy; R.M. REIS, G.G.A. SAGLIETTI, V. OLIVEIRA, E.A. TICIANELLI, Instituto de Quimica de São Carlos - USP, Brazil; N. HODNIK, F. RUIZ-ZEPEDA, National Institute of Chemistry - Ljubljana, Slovenia

FE-1:L10 Direct addition of Lithium and Cobalt Oxide to Ce_{0.8}Gd_{0.2}O_{1.95} Electrolytes to Improve Microstructural an Electrochemical Properties in IT-SOFC at Lower Sintering Temperature

G. ACCARDO¹, D. FRATTINI², H.C. HAMC¹, S.P. YOON¹, ¹Fuel Cell Research Center, Korea Institute of Science and Technology, Seoul, South Korea; ²Graduate school of Energy and Environment, Seoul National University of Science and Technology, South Korea

FE-1:L11 Study of Materials Based on La_{0.6}Sr_{0.4}Fe_{1-y}CoyO_{3-x} for Cathodes of Intermediate Temperature Solid Oxide Fuel Cells, (IT-SOFCs)

J. TARTAJ SALVADOR, Instituto de Cerámica y Vidrio (CSIC), Madrid, Spain

FE-1:L12 Bioethanol Fed Directly to Commercial Solid Oxide Fuel Cells
S. TROCINO¹, S.C. ZIGNANI¹, R.M. REIS², G.G.A. SAGLIETTI², V. OLIVEIRA², E.A. TICIANELLI², A.S. ARICO¹, M. LO FARO¹, ¹Institute of Advanced Energy Technologies (ITAE) of the Italian National Research Council (CNR), Messina, Italy; ²Instituto de Quimica de São Carlos - USP, Brazil

FE-1:L13 Strength of Multi-Layered Ceramic Systems for SOCs

A. MASINI, Z. CHLUP, I. DLOUHY, Institute of Physics of Materials, Academy of Sciences of the Czech Republic, Brno, Czech Republic

FE-1:L14 Robust Nano-particles on Active Perovskite Oxide Anode for Solid Oxide Electrochemical Cells

TAE HO SHIN, HANBIT KIM, Korea Institute of Ceramic Engineering & Technology, Jinju-si, South Korea

FE-1:IL15 Industrial-size Biogas-fed SOFC

M. SANTARELLI, M. GANDIGLIO, A. LANZINI, Politecnico di Torino, Torino, Italy; M. ACRI, U. FAUSONE, E. LORENZI, SMAT, Italy; E. FONTELLI, T. HAKALA, CONVION, Finland; S. GIAROLA, A. HAWKES, Imperial College, UK; J. KIVIAHO, M. RAUTANEN, VTT, Finland

Session FE-2

Proton-conducting (PEFCs) and Alkaline (AFCs) Polymer Electrolyte Fuel Cells

FE-2:IL01 Anion Exchange Membranes, Stable in Hot Caustic Solutions

S. HOLDCROFT, Department of Chemistry, Simon Fraser University, Burnaby, Greater Vancouver, BC, Canada

FE-2:IL02 Mößbauer Spectroscopy in Fuel Cell Electrocatalysis of Non-precious Metal Catalysts

U.I. KRAMM, TU Darmstadt, Catalysts and Electrocatalysts, Darmstadt, Germany

FE-2:IL03 Investigations on Thermal Stability and Ionic Conductivity of Doped CeP2O7-ZrP2O7 Solid Solutions for Application as Electrolyte in Intermediate Temperature Fuel Cells

S.K. GAUTAM, L. MATHUR, A.K. JAISWAL, D. KUMAR, B. SINGH, Department of Ceramic Engineering, Indian Institute of Technology, Banaras Hindu University, Varanasi, India

FE-2:IL04 Nano-structured Hydrogen Oxidation Electrocatalysts for Anion Exchange Membrane Fuel Cells

H.A. MILLER, A. LAVACCHI, F. VIZZA, M. BELLINI, M. FOLLIERO, M. PAGLIARO, J. FILPI, A. MARCHIONNI, M. MARELLI, F. DI BENEDETTO, F. D'ACAPITO, D.R. DEKEL, CNR-ICCOM, Sesto Fiorentino, Italy

FE-2:IL05 Proton Conductivity in Intermediate Temperature Electrolyte Membranes - New Insights and Perspectives

QINGFENG LI, D. AILI, H. BECKER, L.N. CLEEMANN, J.O. JENSEN, Section of Proton Conductors, Department of Energy Conversion and Storage, Technical University of Denmark, Lyngby, Denmark

FE-2:IL06 State-of-the-art polymer Electrolyte Fuel Cells (PEFC): The Remaining Research Challenges

K.A. FRIEDRICH, P. GAZDZICKI, J. MITZEL, M. SCHULZE, German Aerospace Center (DLR), Institute of Engineering Thermodynamics, Stuttgart, Germany; R. HIESGEN, University of Applied Sciences Esslingen, Department of Basic Science, Esslingen, Germany

FE-2:IL07 Ti-based Perovskite Materials as Co-catalysts and Membrane Additives in Proton-conducting Polymer Electrolyte Fuel Cells

M.A. NAVARRA, L. MAZZAPIODA, S. PANERO, Department of Chemistry, Sapienza University of Rome, Rome, Italy

FE-2:IL08 Cobalt Platinum Bronze as a Catalyst for Polymer Electrolyte Fuel Cells

YUJI KAMITAKA, **YU MORIMOTO**, Toyota Central R&D Labs., Inc., Nagakute, Aichi, Japan

FE-2:IL09 Recent Materials in Proton Exchange Membrane Fuel Cell (PEMFC)

M. JOURDANI, H. MOUNIR, A. EL MARJANI, Department of Mechanical Engineering, Mohammadia School of Engineering, University Mohamed V, Rabat, Morocco

FE-2:IL10 Electro-catalysis for Electro-chemicals

J. ROSSMEISL, University of Copenhagen, Kobenhavn, Denmark

FE-2:IL11 Platinum Dissolution: From Model Surfaces to Applied Fuel Cell Catalysts

S. CHEREVKO, Forschungszentrum Jülich GmbH, Helmholtz-Institute Erlangen-Nürnberg for Renewable Energy (IEK-11), Erlangen, Germany

FE-2:L12 Remaining Challenges in Anion Exchange Membrane Fuel Cells

D.R. DEKEL, Technion - Israel Institute of Technology, Haifa, Israel

FE-2:L13 PEM H2/O2 batteries: Performances and Limitations

P. MILLET, Université Paris-Sud, Orsay, France

Session FE-3

Direct Alcohol Fuel Cells (DAFCs)

FE-3:L01 Ru-modified Carbons by Organometallic Functionalization as Support for Nanostructured Pt: High Performance Pt-Ru Catalysts for the Oxidation of Methanol and Ethanol in Alkaline Media

E. CANDIA-GARCIA¹, **J.A. DIAZ-GUILLEN**¹, **J.C. MARTINEZ-LOYOLA**², **A.A. SILLER-CENICEROS**³, **M.E. SANCHEZ-CASTRO**³, **M. SANCHEZ-VAZQUEZ**⁴, **B. ESCOBAR-MORALES**⁵, **I.L. ALONSO-LEMUS**⁶; **F.J. RODRIGUEZ-VARELA**³, ¹Instituto Tecnológico de Saltillo, Saltillo, Coahuila, México; ²Universidad Tecnológica de Coahuila, Ramos Arizpe, Coahuila, México; ³Sustentabilidad de los Recursos Naturales y Energía, Cinvestav Unidad Saltillo, Ramos Arizpe, Coahuila, México; ⁴Centro de Investigación en Materiales Avanzados, PIIT, Apodaca, NL, México; ⁵CONACYT, Centro de Investigación Científica de Yucatán, Mérida, Yucatán, México; ⁶CONACYT, Sustentabilidad de los Recursos Naturales y Energía, Cinvestav Unidad Saltillo, México

FE-3:L02 Synthesis and Characterization of Co-N-C and Fe-N-C for Application as Methanol Tolerant Catalysts in DMFCs

C. LO VECCHIO, **G. MONFORTE**, **A.S. ARICO**, **V. BAGLIO**, Istituto di Tecnologie avanzate per l'Energia "Nicola Giordano" (ITAE-CNR), Messina, Italy

FE-3:L03 Activity and Degradation Study of a Fe-N-C Catalyst for ORR in Direct Methanol Fuel Cell (DMFC)

I. MARTINAIU^{1,2}, **A.H.A. MONTEVERDE VIDELA**³, **S. SPECCHIA**³, **U.I. KRAMM**^{1,2}, ¹TU Darmstadt, Catalysts and Electrocatalysts, Dept. of Materials- and Earth Science and Dept. of Chemistry, Darmstadt, Germany; ²Graduate School of Excellence Energy Science and Engineering, Darmstadt, Germany; ³Politecnico di Torino, Dip. Scienza Applicata e Tecnologia, Torino, Italy

FE-3:IL04 Electrocatalyst Supports for Direct Methanol Fuel Cells

M.V. MARTINEZ-HUERTA, Institute of Catalysis and Petrochemistry, CSIC, Madrid, Spain

FE-3:IL05 Understanding Water and Methanol Transport Properties in Ionomers and Composite Membranes Based on Non-fluorinated Polymers for Fuel Cell Applications

I. NICOTERA, C. SIMARI, Dept. of Chemistry and Chemical Technology, University of Calabria, Rende (CS), Italy; A. ENOTIADIS, National Center for Scientific Research "Demokritos", Athens, Greece

FE-3:IL06 Catalysts with Low Noble Metal Content for Ethanol Electro-oxidation

N. SHAKIBI NIA, **C. RÜDIGER**, **A. PADUANO**, **G. GARCÍA**, **A. MARTUCCI**, **E. PASTOR**, **J. KUNZE-LIEBHÄUSER**, Institut für Physikalische Chemie, Leopold-Franzens-Universität Innsbruck, Innsbruck, Austria; Department of Industrial Engineering, University of Padova, Padua, Italy; Instituto de Materiales y Nanotecnología, Universidad de La Laguna, La Laguna, Spain

FE-3:IL07 Nano-sized Platinum-free Electrocatalysts in Alkaline Direct Alcohol Fuel Cells: Catalyst Design and Principles

K.I. OZOEMENA, Molecular Sciences Institute, School of Chemistry, University of the Witwatersrand, Johannesburg, South Africa

FE-3:IL08 Electro-catalysts for Direct Methanol Fuel Cells

D. SEBASTIAN, **C. ALEGRE**, **M.J. LAZARO**, Instituto de Carboquímica, CSIC, Zaragoza, Spain; **V. BAGLIO**, **A.S. ARICO**, Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano", CNR, Messina, Italy

SYMPOSIUM FF

PROGRESS IN MATERIALS AND DEVICES FOR DIRECT THERMAL-TO-ELECTRIC ENERGY CONVERSION

Session FF-1

Theoretical Concepts and Basic Approaches for High Efficiency Thermal-to-electrical Energy Conversion

FF-1:IL01 Thermoelectrics in Strongly Correlated Electron Systems

ICHIRO TERASAKI, Department of Physics, Nagoya University, Nagoya, Japan

FF-1:IL02 Electronic Structure Calculations of Energy Converting Alloys by KKR-CPA Method

J. TOBOLA, **S. KAPRZYK**, **M. RYBSKI**, **B. WIENDLOCHA**, AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Krakow, Poland

FF-1:IL03 Optimization of Nanostructured Thermoelectrics through Computer Simulations

K. TERMENTZIDIS, CETHIL UMR 5008, CNRS, INSA of Lyon, Villeurbanne, France

FF-1:IL04 High Throughput DFT Calculations - Screening for New TE Compounds

G.K.H. MADSEN, Institut für Materialchemie, TU Wien, Vienna, Austria

FF-1:IL05 Electric Power Generation from Waste Heat without Temperature Gradient

SHINJI MUNETOH, **YUKI OSAKABE**, **OSAMU FURUKIMI**, Kyushu University, Fukuoka, Japan

FF-1:IL06 Ab Initio Calculations as a Guiding Tool for the Study of Phase Stability of Thermoelectric Materials

D. FUKS, **Y. GELBSTEIN**, Materials Engineering Department, Ben Gurion University of the Negev, Beer Sheva, Israel

FF-1:IL07 Structuring Intuition with Theory: The High-throughput Way

M. FORNARI, Department of Physics and Science of Advanced Materials Program, Central Michigan University, Mount Pleasant, MI, USA

FF-1:IL08 Ab Initio Calculations of the Thermal Conductivity, Discovery of New Materials, and Multi-scale Modeling

L. CHAPUT, LEMTA, CNRS UMR-7563, Univ. Lorraine, Vandoeuvre les Nancy, France

FF-1:IL09 Thermal Transport and Chemical Bonding in Clathrates

Y. GRIN, Max-Planck-Institut für Chemische Physik fester Stoffe, Dresden, Germany

FF-1:L10 Advanced Protective Layers for Improved Chemical Stability and Corrosion Resistance in CoSb₃ and Mg₂Si Based Materials - Experimental and Theoretical Aspects

A. KOLEZYNSKI, J. LESZCZYNSKI, P. NIERODA, AGH University of Science and Technology, Faculty of Materials Science and Ceramics, Krakow, Poland

FF-1:L11 The Mechanism of Conductivity Enhancement in PEDOT:PSS through Solvent Treatment

YILDIRIM EROL¹, XUE YONG¹, GANG WU¹, JIAN-SHENG WANG², **SHUO-WANG YANG¹**, ¹Institute of High Performance Computing, Agency for Science, Technology and Research, Singapore, ²Department of Physics, National University of Singapore, Singapore

Session FF-2

Novel Materials for high Efficiency Thermal-to-electrical Energy Conversion

FF-2:IL01 Thermoelectricity of Liquid-like Cu₂X (X = S, Se, Te)

C. UHER, University of Michigan, Ann Arbor, MI, USA

FF-2:IL02 Towards a Magnesium-silicide Based Thermoelectric Generator: Material and Contact Development for n- and p-type Magnesium Silicide Based Solid Solutions

J. DE BOOR¹, H. KAMILA¹, P. PONNUSAMY¹, M. YASSERI^{1,2}, A. SANKHLA¹, N.H. PHAM¹, N. FARAHI¹, E. MÜLLER^{1,2}, ¹Institute of Materials Research, German Aerospace Center, Koeln, Germany, ²Institute of Inorganic and Analytical Chemistry, Justus Liebig University Giessen, Giessen, Germany

FF-2:IL03 High Electron Mobility and Stability of n-type Mg₃(Sb,Bi)₂ TSUTOMU KANNO, H. TAMAKI, H.K. SATO, Panasonic Corporation, Seika, Kyoto, Japan; Y. MIYAZAKI, Tohoku University, Sendai, Miyagi, Japan

FF-2:IL04 Thermoelectric Properties in Dirac/Weyl Semimetals
QIANG LI, Condensed Matter Physics & Materials Science Department, Brookhaven National Laboratory, Upton, New York, USA

FF-2:IL05 Highly Efficient Silicides Based Thermoelectric Materials
T. KYRATSI, Department of Mechanical and Manufacturing Engineering, University of Cyprus, Nicosia, Cyprus

FF-2:IL06 Transport Properties of Homologous Compounds (PbSe)₅(Bi₂Se₃)_{3m} (m = 1, 2 and 3)

S. SASSI, C. CANDOLFI, A. DAUSCHER, **B. LENOIR**, Institut Jean Lamour, UMR 7198 CNRS, Université de Lorraine, Campus Artem, Nancy Cedex, France

FF-2:IL07 Renewed Interest for Heusler and Half-Heusler Alloys for Thermoelectric Applications

E. BAUER, B. HINTERLEITNER, I. KNAPP, A. GRYTSIV, Technische Universität Wien, Institute of Solid State Physics, Vienna, Austria; P. ROGL, G. ROGL, University of Vienna, Institute of Material Chemistry; A. TAVASSOLI, University of Vienna, Institute of Material Chemistry and C. Doppler Laboratory for Thermoelectricity, Vienna, Austria

FF-2:IL08 Development of Thermoelectric Borides toward Topping Cycles

TAKAO MORI, National Institute for Materials Science (NIMS), Tsukuba, Japan

FF-2:IL09 Thermal Conductivity over Engineered Inorganic-organic Interfaces

M. KARPPINEN, Aalto University, Department of Chemistry and Materials Science, Espoo, Finland

FF-2:IL10 Solar Thermoelectric Materials Development

A. WEIDENKAFF, WENJIE XIE, XINGXING XIAO, University of Stuttgart, Stuttgart, Germany

FF-2:IL11 Structural Features and Transport Properties in Ternary and Quaternary Thermoelectric Sulfides

E. GUILMEAU¹, C. BOURGES¹, V. PAVAN KUMAR¹, L. PARADIS-FORTIN^{1,2}, P. LEMOINE², O.I. LEBEDEV¹, T. BARBIER¹, B. RAVEAU¹, B. MALAMAN³, G. LE CAER⁴, M. OHTA⁵, K. SUEKUNI⁶, A.R. SUPKA⁷, R. AL RAHAL AL ORABI⁷, M. FORNARI⁷, ¹Lab. CRISMAT, Caen, France; ²Institut des Sciences Chimiques de Rennes (ISCR), Rennes, France; ³Institut Jean Lamour, Vandœuvre-lès-Nancy, France; ⁴Institut de Physique de Rennes (IPR), Rennes, France; ⁵Research Institute for Energy Conservation, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan; ⁶Dept. of Applied Science for Electronics and Materials, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan; ⁷Dept. of Physics and Science of Advanced Materials Program, Central Michigan University, USA

FF-2:IL12 Thermoelectric Properties of Mn₂V(Al_{1-x}Si_x) Full-Heusler Alloys

HEZHANG LI, KEI HAYASHI, YUZURU MIYAZAKI, Tohoku University, Sendai, Japan

FF-2:L13 Effects of Pb Doping on the Seebeck Co-efficient and Electrical Properties of Ti₈.67Pb_xSb_{1.33-x}Te₆ Chalcogenide System

W.H. SHAH, Department of Physics, International Islamic University, Islamabad, Pakistan

Session FF-3

Devices Technologies and Applications for Thermoelectrics, Thermionics, and Thermophotovoltaics

FF-3:IL01 Next Generation Thermionic Energy Conversion for Space Application

V.I. KUZNETSOV, Ioffe Institute, St. Petersburg, Russia

FF-3:IL02 Ultra High Temperature Thermophotovoltaic Technology Combined with Thermionic Energy Conversion

A. DATAS, E. ANTOLIN, P.G. LINARES, J. VILLA, A. MARTI, Instituto de Energía Solar, Universidad Politécnica de Madrid, Madrid, Spain; D.M. TRUCCHI, A. BELLUCCI, M. GIROLAMI, Istituto di Struttura della Materia - Consiglio Nazionale delle Ricerche, Monterotondo Scalo, Rome, Italy; A. VITULANO, G. SABBATELLA, Ionvac Process SRL. Colli di Enea, Rome, Italy

FF-3:LO3 STEALS a Modular Direct Conversion Thermal System with Integrated Storage

D. GINLEY¹, P. PARILLA¹, J. ALLEMAN¹, J. VIDAL¹, G. GLATZMAIER¹, J. REA², C. OSHMAN², A. SINGH², N. SIEGEL³, J. SHARP⁴, M. WHITE⁵, P. BREHM⁶, S. DRANEY⁶, G. BUCHHOLZ⁶, E. TOBERER⁷, ¹NREL, Golden, CO, USA; ²CSM, Golden, CO, USA; ³Bucknell University; ⁴Marlow, ⁵Infinia Tech Corp.

FF-3:LO4 Radioisotope Thermoelectric Generators for the European Space Nuclear Power Programme

R. AMBROSI¹, H. WILLIAMS¹, E.J. WATKINSON¹, A. BARCO¹, R. MESALAM¹, M. REECE², KAN CHEN³, K. SIMPSON³, M. ROBBINS³, R. TULEY³, C. BURGESS⁴, M.-C. PERKINSON⁴, A. WALTON⁴, C. STROUD⁵, A. GODFREY⁶, S. GIBSON⁶, K. STEPHENSON⁶, T. CRAWFORD¹, C. BICKNELL¹, J. SYKES¹, M. SARFIELD⁷, T. TINSLEY⁷, C. FONGARLAND⁸, D. KRAMER⁹, ¹University of Leicester, Leicester, UK; ²Queen Mary University of London, London, UK; ³European Thermodynamics, Kibworth, Leicester, UK; ⁴Airbus Defence and Space, Stevenage, UK; ⁵Lockheed Martin, Amthill, UK; ⁶European Space Agency, ESTEC, Netherlands; ⁷National Nuclear Lab., Sellafield, UK; ⁸Ariane Group, Paris, France; ⁹University of Dayton Research Institute, Dayton, OH, USA

FF-3:IL05 Variation in Device Design for Low \$/W and Flexible System

WOCHUL KIM, Yonsei University, Seoul, South Korea

FF-3:LO6 Importance of Electrical Impedance Matching on Efficiency and Power in Integrated Thermoelectric Generator Circuits

MARK LEE, Department of Physics, The University of Texas at Dallas, Richardson, TX, USA

FF-3:IL07 Additive Manufacturing of Thermoelectric Devices

S. LeBLANC, Department of Mechanical & Aerospace Engineering, The George Washington University, Washington, Columbia, USA

FF-3:LO8 Thermionic Stages Based on CVD Diamond for High-temperature Conversion of Concentrated Solar Energy

A. BELLUCCI¹, M. GIROLAMI¹, M. MASTELLONE¹, S. ORLANDO¹, R. POLINI^{1,2}, D.M. TRUCCHI¹, ¹CNR-ISM, Rome, Italy; ²Dept. of Chemical Sciences and Technologies, Univ. di Roma "Tor Vergata", Rome, Italy

FF-3:IL09 Thermoelectric Power Generation from Nanostructured PbTe and Colusite: Materials and Modules

MICHIHIRO OHTA, P. JOOD, ATSUSHI YAMAMOTO, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan; KOICHIRO SUEKUNI, Kyushu University, Kasuga, Fukuoka, Japan; M.G. KANATZIDIS, Northwestern University, Evanston, Illinois, USA, and Argonne National Laboratory, Argonne, Illinois, USA

FF-3:IL10 Enhancing Solar Energy Conversion by Hybrid Photovoltaic Thermoelectric Cells

D. NARDUCCI, Department of Materials Science, University of Milano Bicocca, Milan, Italy

FF-3:IL11 Power Generation and Durability of Oxide Based Thermoelectric Module

RYOJI FUNAHASHI¹, T. URATA¹, Y. MATSUMURA¹, M. SUZUKI¹, H. MURAKAMI¹, H. IKENISHI¹, T. TAKEUCHI¹, R.O. SUZUKI², S. SASAKI³, S. SUGIYAMA³, ¹National Institute of Advanced Industrial Science & Technology, Ikeda, Osaka, Japan; ²Graduate School of Engineering, Hokkaido University, Japan; ³Akita Industrial Technology Center, Japan

FF-3:IL12 Integration of Skutterudites in Thermoelectric Devices

D. KENFAUI, I. KOGUT, B. LENOIR, C. CANDOLFI, **A. DAUSCHER**, Institut Jean Lamour, UMR 7198 CNRS, Université de Lorraine, Campus Artem, Nancy Cedex, France; A. JACQUOT, J. KÖNIG, Fraunhofer IPM, Freiburg, Germany

SYMPOSIUM FG

MAGNETIC MATERIALS FOR ENERGY

Session FG-1

Hard Magnetic Materials

FG-1:IL01 New Research Strategies in RE-based Magnets

A.M. GABAY, G.C. HADJIPANAYIS, University of Delaware, Newark, DE, USA

FG-1:IL02 High-performance Permanent Magnets without Rare Earths: Challenges and Perspectives

K.P. SKOKOV, O. GUTFLEISCH, Technische Universität Darmstadt, Institut für Materialwissenschaft, Darmstadt, Germany

FG-1:IL03 Multidriver Processing Routes to Chemical Order in FeNi

L.H. LEWIS, Northeastern University, Boston, MA, USA

FG-1:IL04 Heusler Compounds: Towards Rare-Earth-Free Permanent Magnets

C. FELSER, A. MARKOU, Max Planck Institute for Chemical Physics of Solids, Dresden, Germany

FG-1:IL05 Intrinsic Magnetic Properties of RFe₁₂ Based Hard Magnetic Phase

YUSUKE HIRAYAMA, Magnetic Powder Metallurgy Research Center, National Institute of Advanced Industrial Science and Technology, Nagoya, Japan

FG-1:IL06 Designing Permanent Magnets by Breaking Cubic Symmetry with Interstitials

HONGBIN ZHANG, Institute of Materials Science, TU Darmstadt, Darmstadt, Germany

FG-1:IL07 Hard Magnetic Materials based on Nanowires

J. PING LIU, Department of Physics, University of Texas at Arlington, Arlington, TX, USA

FG-1:IL08 Recent Advances in Micro-magnetic Modelling of Permanent Magnets

T. SCHREFL, A. KOVACS, J. FISCHBACHER, M. GUSENBAUER, Danube University Krems, Wiener Neustadt, Austria

FG-1:IL09 Novel Developments in Hybrid Ferrite-based Hard Nanomaterials

C. DE JULIAN FERNANDEZ, IMEM - CNR, Parma, Italy

FG-1:IL10 New Processing of RE-based Magnetic Materials

S. KOBE, Jožef Stefan Institute, Ljubljana, Slovenia

FG-1:IL11 Study of Anisotropic Bonded Permanent Magnetic Materials

JINBO YANG, JINGZHI HAN, School of Physics, Peking University, Beijing, China

FG-1:IL12 Towards the Optimized Use of Permanent Magnets: Development of 3d Printed MagnetsD. SUESS¹, C. HUBER¹, S. SCHUSCHNIGG³, M. GRÖNEFELD³, ¹Christian Doppler Laboratory for Advanced Magnetic Sensing and Materials, Faculty of Physics, University of Vienna, Vienna, Austria; ²Magnetfabrik Bonn GmbH, Bonn, Germany; ³Department of Polymer Engineering and Science, Montanuniversität Leoben, Leoben, Austria

Session FG-2

Soft Magnetic Materials

FG-2:IL01 Developments in Metal Amorphous Nanocomposite (MANC) Soft Magnetic Materials (SMM) for Power Applications

M.E. MCHENRY, Carnegie Mellon University, Pittsburgh, PA, USA

FG-2:IL02 Magnetic Sensors and Actuators Based on Soft Magnetic Materials

C. GOMEZ-POLO, I. ROYO-SILVESTRE, J.M. JIMENEZ-RUIZ, J.J. BEATO-LOPEZ, Physics Department & Institute for Advanced Materials (INAMAT), Universidad Pública de Navarra, Pamplona, Spain

FG-2:IL03 Engineering of Soft Magnetic Properties of Amorphous and Nanocrystalline Magnetic Microwires for Sensor ApplicationsA. ZHUKOV^{1,2,3}, M. IPATOV^{1,2}, A. TALAAT^{1,2}, J.M. BLANCO², M. CHURYUKANOVA⁴, V. ZHUKOVA^{1,2}, ¹Dept. Phys. Mater., University of Basque Country, UPV/EHU San Sebastián, Spain; ²Dpto. de Física Aplicada, EUPDS, UPV/EHU, San Sebastian, Spain; ³IKERBASQUE, Basque Foundation for Science, Bilbao, Spain; ⁴National University of Science and Technology «MISIS», Moscow, Russia**FG-2:IL04 Effect of Stress Components on Magnetostatic and Magnetostrictive Properties of Amorphous Microwires**V. RODIONOVA^{1,2}, K. CHICHAY¹, I. BARABAN¹, A. LITVINOVA¹, ¹STP "Fabrika" and Center for Functionalized Magnetic Materials (FunMagMa), Immanuel Kant Baltic Federal University, Kaliningrad, Russia; ²National University of Science and Technology «MISIS», Moscow, Russia**FG-2:IL05 Magnetic Properties of Electrocatalytically Active 3D Nanoporous Fe-containing Metallic Films Prepared by Micelle-assisted Electrodeposition**E. PELLICER¹, E. ISARAIN-CHÁVEZ¹, M.D. BARÓ¹, J. SORT^{1,2}, ¹Departament de Física, Universitat Autònoma de Barcelona, Bellaterra, Spain; ²Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain**FG-2:IL06 Multi-parameter Search of Optimal Properties of Soft Magnetic Microwires**A. CHIZHIK¹, J. GONZALEZ¹, A. ZHUKOV^{1,2}, A. STUPAKIEWICZ³, ¹Universidad del País Vasco, UPV/EHU, San Sebastián, Spain; ²IKERBASQUE, Basque Foundation for Science, Bilbao, Spain; ³Laboratory of Magnetism, University of Białystok, Białystok, Poland**FG-2:IL07 Soft Magnetic Ferrites for Biomedical Applications**

P. TIBERTO, G. BARRERA, F. CELEGATO, M. COISSON, Nanoscience and Materials Division, INRIM, Torino, Italy

FG-2:IL08 Magnetite Nanoparticles Biosynthesized by Magnetotactic Bacteria for Biomedical Application

M.L. FERNANDEZ-GUBIEDA, Departamento de Electricidad y Electrónica, Universidad del País Vasco UPV/EHU, Leioa, Spain

Session FG-3

Magnetocaloric and Multifunctional Magnetic Materials

FG-3:IL01 New Concepts for Caloric Cooling

O. GUTFLEISCH, T. GOTTSCHALL, TU Darmstadt and HZDR Dresden, Germany

FG-3:IL02 Thermodynamics of Multicaloric Materials

T. CASTAN, LL. MAÑOSA, A. PLANES, Departament de Física de la Matèria Condensada, Facultat de Física, Universitat de Barcelona, Spain; A. SAXENA, Los Alamos National Laboratory, NM, USA; E. STERN, Department of Material Sciences, University of Cambridge, UK

FG-3:IL03 Tuning Magnetocaloric Materials with Stress

X. MOYA, Department of Materials Science, University of Cambridge, Cambridge, UK

FG-3:IL04 Materials with Giant Mechanocaloric Effects: Cooling by Strength

L. MANOSA, A. PLANES, Departament de Física de la Matèria Condensada, Universitat de Barcelona, Barcelona, Spain

FG-3:IL05 Structural Instabilities of Heusler Alloys

P. ENTEL, University Duisburg-Essen, Duisburg, Germany

FG-3:IL06 Shell Magnetism in Heusler CompoundsM. ACET¹, A. ÇAKIR², ¹Faculty of Physics, University of Duisburg-Essen, Duisburg, Germany; ²Department of Metallurgical and Materials Engineering, Mugla Sıtkı Kocman University, Mugla, Turkey**FG-3:IL07 Ni-Mn-In Heusler Alloys Showing both Direct and Inverse Magnetocaloric Effect for Room Temperature Magnetic Refrigeration**

S. FABBRICI, MIST E-R srl, Bologna, Italy; C. BENNATI, R. CABASSI, D. CALESTANI, F. ALBERTINI, IMEM-CNR, Parma, Italy; F. CUGINI, N. SARZI AMADE, M. SOLZI, SMFI Department, University of Parma, Parma, Italy; A. PEPICIELLO, C. VISIONE, Engineering dep., University of Sannio, Benevento, Italy

FG-3:IL08 Comparison of Magnetic and Magnetocaloric Study of Polycrystalline Composites

A. MARZOUKI, Ajimi Centre de Recherche en Numérique, Sfax Technoparc, Sfax, Tunisia

FG-3:IL09 Kinetics of the Heat Flux Avalanches at the First Order Magnetic Transitions in Magnetocaloric MaterialsV. BASSO¹, M. PIAZZI^{1,2}, C. BENNATI³, ¹Istituto Nazionale di Ricerca Metrologica, Torino, Italy; ²Università degli Studi di Pavia, Pavia, Italy; ³Istituto dei Materiali per l'Elettronica ed il Magnetismo - CNR, Parma, Italy**FG-3:IL10 Efficient Energy-conversion near Room-temperature with Transition Metal Based Magnetic Materials**

E. BRUECK, N. VAN DIJK, Fundamental Aspects of Materials and Energy, Faculty of Science, TU Delft, Delft, Netherlands

FG-3:IL11 Magnetocaloric Performance of La(FeSi)₁₃ Compounds

L.E. COHEN, Imperial College London, London, UK

FG-3:IL12 Molecular Spin Crossover Crystals as Barocalorics
S. VALLONE^{1,2}, A.M. DOS SANTOS³, J. MOLAISSON³, M. HALCROW⁴, K. SANDEMAN^{1,2}, ¹The Graduate Center of The City University of New York, USA; ²Brooklyn College of The City University of New York, USA; ³Oak Ridge National Laboratory, USA; ⁴University of Leeds, USA

FG-3:IL13 Manipulating Magnetic Frustration for Caloric Effects
J.B. STAUNTON, E. MENDIVE-TAPIA, Department of Physics, University of Warwick, Coventry, UK

FG-3:IL14 Tuning Magnetism and Functional Properties in Ferromagnetic Shape Memory Films and Nanodisks

F. CASOLI, M. TAKHSHA GHAHFAROKHI, L. NASI, R. CABASSI, F. ALBERTINI, IMEM - CNR, Parma, Italy; S. FABBRICI, MIST E-R Laboratory, Bologna, Italy; F. CELEGATO, G. BARRERA, P. TIBERTO, INRIM, Torino, Italy; M. CAMPANINI, EMPA, Dübendorf, Switzerland; C. MAGEN, Instituto de Nanociencia de Aragón, Zaragoza, Spain; V. GRILLO, NANO - CNR, Modena, Italy

Session FG-4

Magnetic Devices and Components for Energy Applications

FG-4:IL01 The Use of Compositionally Graded Films as Model Systems to Study Magnetic Materials for Energy Applications

N.M. DEMPSEY¹, N.B. DOAN¹, Y. HONG^{1,2}, I. DE MORAES¹, A. DIAS¹, G. GOMEZ¹, V.M.T.S. BARTHEM^{1,3}, M. BONFIM⁴, L. RANNO¹, G. GIVORD^{1,3}, ¹Univ. Grenoble Alpes, CNRS/UGA, Grenoble INP, Institut Néel, Grenoble, France; ²School of Materials Science and Engineering, South China University of Technology, Guangzhou, China; ³Instituto de Física, Universidade Federal do Rio de Janeiro, RJ, Brazil; ⁴DELTA, Universidade Federal do Paraná, Curitiba, Brazil

FG-4:IL02 Thermomagnetic Energy Generation Based on Magnetic Shape Memory Alloy Films

M. KOHL, M. GUELTIG, H. OSSMER, Institute of Microstructure Technology (IMT), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany; H. MIKI, M. OHTSUKA, Tohoku University, Sendai, Japan

FG-4:IL03 Magnetocaloric Heat Pumps

C.R.H. BAHL, S. DALL'OLIO, D. ERIKSEN, K. ENGELBRECHT, Department of Energy Conversion and Storage, Technical University of Denmark, Roskilde, Denmark

FG-4:IL04 Novel Concept for Caloric Cooling - The Magnetocaloric Heat Pipe

L. MAIER, T. HESS, **K. BARTHOLOME**, Fraunhofer Institute for Physical Measurement Techniques IPM, Freiburg, Germany

SYMPOSIUM FH

ADVANCED PHOTOCATALYTIC MATERIALS FOR ENERGY TRANSITION, SOLAR-DRIVEN CHEMISTRY AND ENVIRONMENTAL APPLICATIONS

Session FH-1

Design Elements and Advanced Concepts for Photofunctional Materials

FH-1:IL01 Tuning of Photoelectrochemical Activity by Altering Catalytic Binding Site Charge Density

M. HOFFMANN, Linde-Robinson Laboratories, California Institute of Technology, Pasadena, CA, USA

FH-1:IL02 Ultra-efficient Solar CO₂ Conversion using Oxide Semiconductor Electrodes

UNSEOCK KANG^{1,2}, SEUNG YO CHOI^{1,2}, HYE WON JEONG^{1,2}, GUANGXIA PIAO^{1,2}, DONG SUK HAN³, **HYUNWOONG PARK^{1,2}**, ¹School of Energy Engineering, Kyungpook National University, Daegu, South Korea; ²School of Architectural, Civil, Environmental, and Energy Engineering, Kyungpook National University, Daegu, South Korea; ³Chemical Engineering Program, Texas A&M University at Qatar, Education City, Doha, Qatar

FH-1:IL03 Nanocomposite Materials as Photoelectrodes in Solar Fuel Generation: Opportunities and Challenges

C. JANAKY, E. KECSENOVITY, B. ENDRODI, University of Szeged, Szeged, Hungary

FH-1:IL04 Role of Electron Traps in Photocatalysis: Identification and Characterization of Metal Oxide Particulate Photocatalysts

BUNSHO OHTANI, Institute for Catalysis, Hokkaido University, Sapporo, Japan

FH-1:IL05 Mechanistic Aspects of Photocatalysis - Control of Photoinduced Redox Processes

W. MACYK, M. KOBIELUSZ, M. TROCHOWSKI, M. SUROWKA, M. PACIA, J. KUNCEWICZ, Faculty of Chemistry, Jagiellonian University in Kraków, Kraków, Poland

FH-1:IL06 The Photochemical Reactivity of Polar Surface Domains on Non-polar Surfaces

G.S. ROHRER, P.A. SALVADOR, Carnegie Mellon University, Dept. of Materials Science and Engineering, Pittsburgh, PA, USA

FH-1:IL07 Nano-graphitic Templates and Hierarchical Nanostructures in Multi-functional Electrocatalysts for the Artificial Leaf

G. VALENTI, A. BONI, M. MARCACCIO, S. RAPINO, M. IURLLO, **F. PAOLUCCI**, University of Bologna, Bologna, Italy; P. FORNASIERO, M. PRATO, University of Trieste, Italy; M. BONCHIO, University of Padua, Italy

FH-1:IL08 Advanced Organic/Inorganic Hybrid Materials Derived from Tunable Si-based NanoBuilding Blocks

S. DIRE¹, E. CALLONE, M. D'ARIENZO, B. DI CREDICO, R. SCOTTI, F. RIBOT, University of Trento, Dept. Industrial Engineering, Trento, Italy; University of Milano-Bicocca, Dept. Materials Science, Milano, Italy; Université Pierre et Marie Curie, CMCP, UMR7574 -UPMC / CNRS / Collège de France, Paris, France

FH-1:IL09 Transient Behavior of Ni/NiO Modified Mg:SrTiO₃ in Photocatalytic Overall Water Splitting

KAI HAN, B. MEI, G. MUL, University of Twente, Enschede, The Netherlands

FH-1:IL10 Coupling Between Enzymes and a Photoactive Sulphide for Photoproduction of H₂ and O₂

C. TAPIA, **J.C. CONESA**, A.L. DE LACEY, M. PITA, Inst. de Catálisis y Petroleoquímica, CSIC, Madrid, Spain; S. SHLEEV, Biomed. Sci., Fac. Health & Society, Malmö University, Malmö, Sweden

Session FH-2

Understanding Fundamentals of Photoinduced Processes and Charge Transport

FH-2:IL01 Atomic Level In situ Microscopy and Spectroscopy of Photocatalyst for Water Splitting

D. HAIBER, Q. LIU, T. BOLAND, **P. A. CROZIER**, Arizona State University, Tempe, AZ, USA

FH-2:IL02 Role of Radical Species and Interparticle Electron Transfer in Photocatalysis

D. BAHNEMANN, Institut fuer Technische Chemie, Gottfried Wilhelm Leibniz Universitaet Hannover, Hannover, Germany

FH-2:IL03 Enhancing Photoelectrochemical Water Splitting Performance using Hematite Anode through Doping and Morphology Control

XIN ZHAO, **ZHONG CHEN**, School of Materials Science and Engineering, Nanyang Technological University, Singapore

FH-2:IL04 Mechanistic Aspects of Photocatalytic CO₂ Reduction

M. DILLA, A. MATEBLOWSKI, S. RISTIG, Max-Planck-Institute for Chemical Energy Conversion, Muelheim/Ruhr, Germany; N. MOUSTAKAS, T. PEPPEL, **J. STRUNK**, Leibniz Institute for Catalysis (LIKAT), Rostock, Germany

FH-2:IL05 Recent Advances in the Search of Effective Materials for Photo-electrochemical Water Splitting

J. AUGUSTYNSKI, Centre for New Technologies, University of Warsaw, Warsaw, Poland

FH-2:IL06 Conduction Band Engineering in TiO₂ and SnO₂: Photocatalysis, Solar Fuel and Solar Cells

L. KAVAN, J. Heyrovsky Institute of Physical Chemistry, Prague, Czech Republic

FH-2:IL07 Electron Transfer and Energy Transfer in Heterogenous Photocatalysis

F. PARRINO, L. PALMISANO, Dipartimento di Energia, Ingegneria dell'Informazione e Modelli Matematici (DEIM), Università degli Studi di Palermo, Palermo, Italy

FH-2:IL08 Studying Mobile Charge-Carriers in Photocatalytic Particles by Time Resolved Microwave Conductivity: Recent Developments
C. COLBEAU-JUSTIN, A. HERISSAN, A.L. LUNA BARRON, M.G. MENDEZ MEDRANO, H. REMITA, Laboratoire de Chimie Physique, CNRS UMR 8000, Université Paris-Sud, Université Paris-Saclay, Orsay, France

FH-2:L09 Probing Local Atomic Structural Variations in Bulk and on Surfaces of TiO₂ Anatase Nanoparticles
QIANLANG LIU, T. BOLAND, P.A. CROZIER, Arizona State University, Tempe, AZ, USA

FH-2:L10 A loof-beam EELS as a Non-destructive, Surface-sensitive Probe for Photocatalyst Nanostructures
D.M. HAIBER, Q. LIU, P.A. CROZIER, School for Engineering of Matter, Transport, & Energy, Arizona State University, Tempe, AZ, USA; S.C. QUILLIN, D.J. MASIELLO, Department of Chemistry, University of Washington, Seattle, WA, USA

FH-2:IL11 Photocarrier Transport and Transfer in Emerging Transition Metal Oxide Photoelectrodes
I.D. SHARP^{1,2}, J.K. COOPER², CHANG-MING JIANG², G. SEGEV², ¹Walter Schottky Institut and Physik Department, Technische Universität München, Garching, Germany; ²Joint Center for Artificial Photosynthesis and Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA

FH-2:L12 A Comparative Study on Defect-rich and Defect-free O-incorporated 1T-MoS₂ Nanosheets for Visible-light Photocatalytic H₂ Evolution
XIA TAO, XIAOHONG ZHANG, NAN LI, JIAOJIAO WU, State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing, China

Session FH-3

Design Approaches for Advanced Applications

FH-3:IL01 Design Rules for Photoactive Materials for Photo Electrochemical Solar Energy Conversion
W. JAEGERMANN, Surface Science Division, TU Darmstadt Materials Science, Darmstadt Germany

FH-3:IL02 Strategies for Stable Water Splitting via Protected Photoelectrodes
I. CHORKENDORFF, SurfCat, Department of Physics, The Technical University of Denmark, Kongens Lyngby, Denmark

FH-3:IL03 Transient Phenomena in Photocatalysis, as Studied by Ultrafast FTIR Measurements
Y. PAZ, I. BENISTI, A. BEN REFAEL, Department of Chemical Engineering, Technion, Haifa, Israel

FH-3:L04 New Strategy for Micro-plastic Degradation: Green Photocatalysis Using a Protein-based Porous N-TiO₂ Semiconductor
M.C. ARIZA-TARAZONA, J.F. VILLAREAL-CHIU, Universidad Autónoma de Nuevo León, Facultad de Ciencias Químicas, San Nicolás de los Garza, N.L., Mexico; C. MUGONI, V. BARBIERI, C. SILIGARDI, Università degli Studi di Modena e Reggio Emilia, Dipartimento di Ingegneria "Enzo Ferrari", Modena, Italy; E.I. CEDILLO-GONZÁLEZ, Universidad Autónoma de Nuevo León, Facultad de Ciencias Químicas, San Nicolás de los Garza, N.L., Mexico

FH-3:L05 Optical Emission from Catalytic Combustion of MeOH/air on Yb₂O₃ Supported Metal Catalysts
J. TERRENI^{1,2}, A. WENGER¹, R. HOLZNER³, A. BORGSCHULTE^{1,2}, ¹Laboratory of Advanced Analytical Technologies, Empa, Dübendorf, Switzerland; ²University Zürich, Department of Chemistry, Zürich, Switzerland; ³Econimo-Drive AG, Cham, Switzerland

FH-3:IL06 Modelling of Solar Water Splitting Devices
S. HAUSSENER, Laboratory of Renewable Energy Science and Engineering, EPFL, Switzerland

FH-3:IL07 Coupling Peroxidase Enzymes with Photocatalytic Hydrogen Peroxide Production
B.O. BUREK, **J.Z. BLOH**, DECHEMA-Forschungsinstitut, Frankfurt, Germany; D.W. BAHNEMANN, Leibniz Universität Hannover, Germany

SYMPOSIUM FI

MATERIALS AND TECHNOLOGIES FOR NEXT GENERATION SOLID STATE LIGHTING

Session FI-1

Material Design and Processing

FI-1:IL01 Intramolecular or Intermolecular Charge Transfer Approaches for Highly Efficient TADF Materials and OLEDs
KEN-TSUNG WONG, Department of Chemistry, National Taiwan University, Taipei, Taiwan

FI-1:IL02 Embedded Lighting for Building Materials as Led Technology Enabler!
S. VENK, OSRAM Spa, Innovation Manager Advanced Concept and New Business Development Digital Systems, RnD, Treviso, Italy

FI-1:IL03 Dye Encapsulated Metal-organic Frameworks for Luminescence and White LED
YUANJING CUI, ZHIYU WANG, BANGLIN CHEN, Guodong Qian State Key Laboratory of Silicon Materials, Cyrus Tang Center for Sensor Materials and Applications, School of Materials Science and Engineering, Zhejiang University, Hangzhou, China

FI-1:IL04 Design of Efficient TADF Materials for OLEDs
TAKUMA YASUDA, Kyushu University, Fukuoka, Japan

FI-1:IL05 Materials and Device Design for Improving the Stability of OLEDs
HIROHIKO FUKAGAWA¹, YUKIKO IWASAKI¹, TSUBASA SASAKI¹, MUNEHIRO HASEGAWA², KATSUYUKI MORII², TAKAHISA SHIMIZU¹, ¹Japan Broadcasting Corporation (NHK), Science & Technology Research Laboratories, Setagaya-ku, Tokyo, Japan; ²Nippon Shokubai Co., Ltd., Suita, Osaka, Japan

FI-1:IL06 Feasibility of Future GaN Large Area Light Emitting Devices
HIROSHI FUJIOKA, K. UENO, A. KOBAYASHI, Institute of Industrial Science, The University of Tokyo, Meguro-ku, Tokyo, Japan; ACCEL-JST, Chiyoda-ku, Tokyo, Japan

FI-1:IL07 Recent Progress and Challenges of InN and In-rich InGaN by RF-MBE
YASUSHI NANISHI¹, TOMOHIRO YAMAGUCHI², TSUTOMU ARAKI¹, ¹Ritsumeikan University, Kusatsu, Sjiga, Japan; ²Kogakuin University, Hachioji, Tokyo, Japan

FI-1:IL08 New Blue Organic Emitters for OLED Lightings
JONGWOOK PARK, Department of Chemical Engineering, Kyung Hee University, Deogyong, Giheung, Yongin, Kyunggi, South Korea

FI-1:IL09 Transparent Spinel ceramics for White Light-Emitting Diodes Applications
M. RADWAN, J. SEDLACEK, Z. LENCES, P. SAJGALIK, Institute of Inorganic Chemistry, Slovak Academy of Sciences, Bratislava, Slovakia

FI-1:IL10 Enhanced Performance of Luminescent Powders due to Coating of Phosphor Particles by Atomic Layer Deposition in a Fluidized Bed Reactor
H.T. HINTZEN¹, O.M. TEN KATE², Y. ZHAO^{2,3}, L.J. YIN^{2,4}, Z. ZHOU^{2,5}, J.R. VAN OMMEN², ¹Luminescent Materials, Faculty of Applied Sciences, Delft University of Technology, Delft, The Netherlands; ²Product & Process Engineering, Faculty of Applied Sciences, Delft University of Technology, Delft, The Netherlands; ³College of Materials, Xiamen University, Xiamen, China; ⁴School of Energy Science and Engineering, University of Electronic Science and Technology of China, Chengdu, China; ⁵Science College of Hunan Agricultural University, Changsha, China

FI-1:IL11 Single-phased Eu²⁺-activated Phosphors with High Color Rendering for Near-UV LED Chips
PENGPENG DAI¹, XINTONG ZHANG¹, YICHUN LIU¹, **XIAOJUN WANG**², ¹Key Laboratory for UV Light-Emitting Materials and Technology of Ministry of Education, Northeast Normal University, Changchun, China; ²Department of Physics, Georgia Southern University, Statesboro, GA, USA

FI-1:IL12 Conjugated Oligomers and Polymers with Absorption and Emission Features in the Near Infrared
U. SCHERF, Macromolecular Chemistry Goup and Institute for Polymer Technology, Bergische Universität Wuppertal, Wuppertal, Germany

FI-1:IL13 Design Strategies for Materials Showing Thermally Activated Delayed Fluorescence and Beyond - Towards the Fourth Generation OLED Mechanism
H. YERSIN, University of Regensburg, Regensburg, Germany

Session FI-2

Optoelectronic and Photonic Processes

FI-2:IL01 Metal Halide Perovskites Light Emitting Devices and Interface Stability

B.P. RAND, Department of Electrical Engineering and Andlinger Center for Energy and the Environment, Princeton University, Princeton, NJ, USA

FI-2:IL02 Realization of High Performance UV Emitters by using AlGaN Materials

MOTOAKI IWAYA¹, TETSUYA TAKEUCHI¹, SATOSHI KAMIYAMA¹, ISAMU AKASAKI^{1,2}, ¹Faculty of Science and Technology, Meijo University, Japan; ²Akasaki Research Center, Nagoya University, Japan

FI-2:IL03 Deep UV LEDs

M.P. HOFFMANN, C. BRANDL, M. TOLLABI-MAZRAEHNO, M. JAMA, N. TILLNER, M.J. DAVIES, C. FRANKERL, G. ROSSBACH, S. ALARCON VILLASECA, **H.-J. LUGAUER**, OSRAM Opto Semiconductors GmbH, Regensburg, Germany

FI-2:IL04 Indirect Excitons in Group III-Nitride-Based Quantum Wells

P. LEFEBVRE, B. JOUAULT, T. GUILLET, C. BRIMONT, P. VALVIN, T. BRETAGNON, M. VLADIMIROVA, Laboratoire Charles Coulomb (L2C), CNRS, University of Montpellier, France; L. LAHOUCADE, N. GRANDJEAN, Institute of Condensed Matter Physics, EPFL, Lausanne, Switzerland; B. DAMILANO, CRHEA-CNRS, Valbonne, France

FI-2:IL05 Enhancing the Electroluminescence of Organic Light-emitting Transistors by Modifying the Metal/Organic Interface with Conjugated Polar Polymers

M. PROSA¹, E. BENVENUTI¹, M.C. PASINI², F. GALEOTTI², U. GIOVANELLA², M. MUCCINI¹, S. TOFFANIN¹, ¹ISMN - CNR, Bologna, Italy; ²ISMAL - CNR, Milano, Italy

FI-2:IL06 Laser Induced White Lighting of Tungsten Filament

M. LUKASZEWICZ, R. TOMALA, W. STREK, Institute of Low Temperature and Structure Research, Polish Academy of Sciences, Wroclaw, Poland

FI-2:IL07 Fabrication of High-quality AlN Template by High-temperature Annealing

HIDETO MIYAKE, Shiyu Xiao, Yusuke Hayashi, Kanako Shojiki, Mie University, Tsu, Japan

FI-2:IL08 Simultaneous Tenfold Brightness Enhancement and Emitted-light Spectral Tunability in Transparent Ambipolar Organic Light-emitting Transistor by Integration of High-k Photonic Crystal

S. TOFFANIN, Istituto per lo Studio dei Materiali Nanostrutturati (ISMN), Consiglio Nazionale delle Ricerche (CNR), Bologna, Italy

FI-2:IL09 THz-QCLs toward High Output Power near Liquid Nitrogen Temperature Operation

TSUNG-TSE LIN, HIDEKI HIRAYAMA, Center for Advanced Photonics, RIKEN, Sendai, Japan

FI-2:L10 Omni-friendly Low Color Temperature OLED

JWO-HUEI JOU, M. SINGH, H.-F. LIN, Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan

Session FI-3

Electro-optical-structural Characterization

FI-3:IL01 Light-emitting Electrochemical Cells: Towards Low-cost Fabrication and High-efficiency Operation

L. EDMAN, The Organic Photonics and Electronics Group, Umeå University, Umeå, Sweden

FI-3:L02 Charge Injection Investigation at the Interface between Metal Contact and Active Layer in Organic Field-effect Transistors

M. NATALI, S.D. QUIROGA, A. LONGO, E. BENVENUTI, F. MERCURI, F. PRESCIMONE, S. TOFFANIN, ISMN-CNR, Bologna, Italy; M. BUONOMO, N. LAGO, A. CESTER, UniPd, Padova, Italy

FI-3:L03 Modification of Silver Emitting Centers at Aging ZnO:Ag Nanocrystal Films

T.V. TORCHYNSKA¹, BR. EL FILALI², G. POLUPAN³, ¹Inst. Politécnico Nacional, ESFM, México City, México; ²Inst. Politécnico Nacional, UPIITA, México City, México; ³Inst. Politécnico Nacional, ESIME, México City, México

FI-3:IL04 Inorganic Perovskite Crystals for Fast Color-conversion Applications

N. LAURAND, Institute of Photonics, Dept. of Physics, SUPA, University of Strathclyde, Glasgow, UK

FI-3:IL05 Organic Light-emitting Field-effect Transistors for Display Applications

M.U. CHAUDHRY, School of Engineering, Durham University, Durham, UK

Session FI-4

Device Architectures and System Integration

FI-4:IL01 Integration and Process Technology for Flexible OLED Lighting Systems

C. MAY, Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, Dresden, Germany

FI-4:IL02 Small Area Light Module Application, Simulation Modelling and Optimization for Architectural Lighting

N. TRIVELLIN, LightCube SRL and University of Padova, Padova, Italy; S. VENK, OSRAM SPA, Treviso, Italy

FI-4:IL03 Micro-Transfer Printing for Display Applications and Interactive Solid State Lighting

A.J. TRINDADE², E. RADAUSCHER¹, S. BONAFEDE¹, D. GOMEZ¹, T. MOORE¹, C. PREVATTE¹, B. RAYMOND¹, A. FECIORU², K. GHOSAL¹, M. MEITL¹, C. BOWER¹, ¹X-Celeprint Inc., USA; ²X-Celeprint Ltd., Cork, Ireland

FI-4:L04 Nano-LEDs based on InGaN Mesoscopic Structures Integrated in a High-frequency Device Layout

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SYMPOSIUM FJ

**DEVELOPMENT AND APPLICATION
OF NEW FUNCTIONAL TRANSPARENT
CONDUCTING AND SEMICONDUCTING
INORGANIC MATERIALS**

Session FJ-1

Fundamentals

FJ-1:IL01 Interfaces and Defects in Semiconducting Oxides

A. KLEIN, Technische Universität Darmstadt, Institute of Materials Science, Darmstadt, Germany

FJ-1:IL02 Excitonic Effects and Dielectric Screening in Transparent Conducting Oxides

A. SCHLEIFE, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA

FJ-1:IL03 A Non-oxide p-type Transparent Semiconductor CuI

NAOOMI YAMADA, Department of Applied Chemistry, Chubu University, Kasugai, Japan

FJ-1:IL04 Atomic Layer Deposition of Transparent Conducting and Charge Transport Layers for Photovoltaic Applications

M. MCCARTHY, L. RYAN, S. O'BRIEN, **I.M. POVEY**, Tyndall National Institute, University College Cork, Cork, Ireland

FJ-1:L05 Size Depending Electron Transport in Core-shell Zn/ZnO Nanotubes

S. DI STASIO, CNR-IM Lab Nanostructures, Light Scattering and X-ray Techniques, Napoli, Italy

FJ-1:IL06 Thio- and Seleno-cyanates: Theory and Applications for an Emerging Class of Multi-functional Materials

L. TSETSERIS, Department of Physics, National Technical University of Athens, Zografou Campus, Athens, Greece

FJ-1:IL07 Electronic Devices from Wide Bandgap Semiconductors

H. VON WENCKSTERN, Felix-Bloch-Institut für Festkörperphysik, Universität Leipzig, Leipzig, Germany

FJ-1:IL08 Thermal Transport in Transparent Conductive Oxide Films

NOBUTO OKA¹, Y. SHIGESATO², ¹Kindai University, Iizuka, Fukuoka, Japan; ²Aoyama Gakuin University, Sagami-hara, Kanagawa, Japan

FJ-1:IL09 First-principles Modeling of Complex Oxide Interfaces

C.G. VAN DE WALLE, Materials Department, University of California, Santa Barbara, CA, USA

FJ-1:IL10 Ab Initio Design of P-type Transparent Conductors: From Oxides to Oxide Chalcogenides

G. TRIMARCHI, Department of Chemistry, Northwestern University, Evanston, IL, USA

Session FJ-2**Material Design and Device Development****FJ-2:IL01 Amorphous Semiconductor Mobility Physics**

J.F. WAGER, School of EECS, Oregon State University, Corvallis, OR, USA

FJ-2:IL02 High-throughput Development of Wide Bandgap Conductive Sulfides

A. ZAKUTAYEV, National Renewable Energy Laboratory, Golden, CO, USA

FJ-2:IL03 Low-dimensional Multi-layer Metal Oxide Semiconductors for Transistor Applications

T. ANTHOPOULOS, King Abdullah University of Science and Technology (KAUST), Division of Physical Sciences and Engineering, Thuwal, Saudi Arabia

FJ-2:IL04 Charge Selective Contacts in Photovoltaic and Photoelectrochemical Devices

J.W. AGER, Joint Center for Artificial Photosynthesis and Materials Sciences Division, Lawrence Berkeley National Laboratory, and Dept. of Materials Science and Engineering, University of California, Berkeley, CA, USA

FJ-2:IL06 Investigating the Effects of Nanostructured Dielectric Lithium Fluoride and Plasmonic Gold Interlayers in Organic Photovoltaics

H. KURT, Istanbul Medipol University, Istanbul, Turkey; **CLEVA W. OW-YANG**, Sabanci University, Istanbul, Turkey

FJ-2:IL07 Alternative Transparent Conductors for Flexible CIGS Thin Film Solar Cells

Y.E. ROMANYUK, L. GREUTER, T. FEURER, R. CARRON, S. NISHIWAKI, S. BUECHELER, A.N. TIWARI, Empa - Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Switzerland

FJ-2:IL08 Flexible, Transparent and Conductive Ag Nanowire Networks

D. BELLET¹, T. SANNICOLÒ^{1,2}, S. AGHAZADEHCHORS^{1,3}, T. PAPANASTASIOU¹, H. VIET-NGUYEN^{1,4}, D. MUÑOZ-ROJAS¹, C. JIMÉNEZ¹, N.D. NGUYEN³, ¹Univ. Grenoble Alpes, LMGP, CNRS, Grenoble, France; ²Univ. Grenoble Alpes, CEA LITEN, Grenoble, France; ³Univ. of Liège, Département de Physique, Liège, Belgium; ⁴CEA-INES, LITEN, Le Bourget-du-Lac, France

FJ-2:IL09 Computational Approach to Synthesis of Functional Polymorphs

D. GINLEY¹, K. PERSSON², L. GARTEN¹, P. SELVARASU¹, J. PERKINS¹, WENHAO SUN², K. POPOV², S. DWARAKNATH², G. CEDER², J. MANGUM³, B. GORMAN³, L. SCHELHAS⁴, M. TONEY⁴, M. AYKOL², Z. CHAN⁵, D. NOCERA⁵, J. HAGGERTY⁶, O. AGIRSEVEN⁶, J. TATE⁶, D. KITCHAEV⁷, W. TUMAS¹, ¹National Renewable Energy Laboratory, Golden, CO, USA; ²Lawrence Berkeley National Laboratory, USA; ³Colorado School of Mines, USA; ⁴SLAC National Accelerator Laboratory, USA; ⁵Harvard University, USA; ⁶Oregon State University; ⁷Massachusetts Institute of Technology, USA

FJ-2:IL10 Graphene Films as Transparent Electrodes

D. NEUMAIER, AMO GmbH, Aachen, Germany

FJ-2:IL11 Response to Mechanical Bending Stress of AZO/Ag/AZO Thin Films

G. TORRISI^{1,2}, I. CRUPI³, S. MIRABELLA^{1,2}, A. TERRASI^{1,2}, ¹University of Catania, Italy; ²CNR-IMM, Catania, Italy; ³University of Palermo, Italy

FJ-2:IL12 Flash Lamp Annealing of Functional Films and Devices

S. SEEGER, M. WEISE, R. MIENTUS, K. ELLMER, Optotransmitter-Umweltschutz-Technologie e.V., Berlin, Germany

FJ-2:IL13 Physical Properties and Applications of Doped BaSnO3 Semiconductors with High Electrical Mobility and Optical Transparency

KEE HOON KIM, Center for Novel States of Complex Materials Research and Institute of Applied Physics, Department of Physics and Astronomy, Seoul National University, Seoul, South Korea

FJ-2:IL14 AZO/Ag/AZO as All-in-one Anti-reflecting and Transparent Electrode

G. TORRISI^{1,2}, R. RACITI², **A. TERRASI**^{1,2}, ¹University of Catania, Italy; ²CNR-IMM, Catania, Italy

FJ-2:IL15 Photonic Processing for Metal Oxide Thin Films

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FJ-2:IL16 Interface Chemistry for Organic Electronics and Optoelectronics

S.R. MARDER, School of Chemistry and Biochemistry, School of Materials Science and Engineering, and Center for Organic Photonics and Electronics, Georgia Institute of Technology, Atlanta, GA, USA

FJ-2:L17 In-Ga-Zn-O Thin Films with Tunable Optical and Electrical Properties Prepared by Reactive High-power Impulse Magnetron Sputtering

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FJ-2:IL18 Growth and Properties of Ga2O3 Thin Films

R. FORNARI^{1,2}, A. BARALDI¹, V. MONTEODORO¹, A. PARISINI¹, M. PAVESI¹, M. BOSI², C. FERRARI², E. GOMBIA², D. KLIMM³, F. MEZZADRI⁴, G. CALESTANI⁴, I. CORA⁵, B. PÉCZ⁵, ¹Dept. of Mathematical, Physical and Computer Sciences, University of Parma, Parma, Italy; ²Institute of Electronic and Magnetic Materials (IMEM-CNR), Parma, Italy; ³Leibniz Institute for Crystal Growth (IKZ), Berlin, Germany; ⁴Dept. of Chemistry, Life Sciences and Environmental Sustainability, University of Parma, Parma, Italy; ⁵Centre for Energy Research, Hungarian Academy of Sciences, Institute for Technical Physics and Materials Science, Budapest, Hungary

FJ-2:IL19 Photosensitive TCO-based Hybrid Materials for Gas Sensor Applications

M.N. RUMYANTSEVA, A.F. NASRIDINOV, E.V. PAKHOVA, E.V. LUKOVSKAYA, O.A. FEDOROVA, A.M. GASKOV, Moscow State University, Moscow, Russia

FJ-2:L20 Use of Electrografted Aryl-layers to Control the Conductivity of ZnO Surfaces

A.R. MCNEILL, A.J. DOWNWARD, **M.W. ALLEN**, University of Canterbury, New Zealand

FJ-2:L21 Reactive Dip-coating of Rhombohedral Delafossite CuAlO2 Based on Mesoporous Alumina Nanofibers

A. SAFFAR SHAMSHIRGAR¹, M. AGHAYAN¹, T.S. TRIPATHI², M. KARPPINEN², M. GASIK³, I. HUSSAINOVA^{1,4}, ¹Department of Mechanical and Industrial Engineering, Tallinn University of Technology, Estonia; ²Department of Chemistry, Aalto University, Aalto, Finland; ³School of Chemistry, Material Science and Engineering, AALTO University, Aalto, Finland; ⁴TMO University, St. Petersburg, Russia

Session FJ-3**Applications****FJ-3:IL01 Phonon Engineering on In2O3- and ZnO-based Thin Films**

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FJ-3:L02 Solution Synthesized Delafossite Nanoparticles for Hole Transport Layer in Organic and Perovskite Solar Cells

T.B. DAUNIS, JIAN WANG, BOYA ZHANG, D. BARRERA, **JULIA W. P. HSU**, University of Texas at Dallas, Richardson, TX, USA; W. DUNLAP-SHOHL, D. MITZI, Duke University, USA

FJ-3:L03 Study of Tungsten Oxide and Magnesium Doped Tin Oxide as Transparent Conductive Oxides for Solar PV Application

A. BIN AFIF, A. GOUGAM, Masdar Institute, Khalifa University of Science and Technology, Masdar city, Abu Dhabi, United Arab Emirates

FJ-3:IL04 Wide Band Gap ZnO Applications

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FJ-3:IL05 Transparent Materials for Perovskite (Opto-)electronics

T. RIEDL, University of Wuppertal, Wuppertal, Germany

FJ-3:IL06 Low Damage Sputtering of TCOs for LEDs

M. MAUTE, Osram Opto Semiconductors GmbH, Regensburg, Germany

FJ-3:IL07 Toward Realization of Ga2O3 Transistors for Power Electronics Applications

MAN HOI WONG, Y. NAKATA, C.-H. LIN, National Institute of Information and Communications Technology, Koganei, Tokyo, Japan; K. SASAKI, Tamura Corp., Sayama, Saitama, Japan, and National Institute of Information and Communications Technology, Koganei, Tokyo, Japan; Y. MORIKAWA, Silvaco Japan Co., Ltd., Yokohama, Kanagawa, Japan; K. GOTO, Tamura Corp., Sayama, Saitama, Japan, and Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan; A. TAKEYAMA, T. MAKINO, T. OHSHIMA, National Institutes for Quantum and Radiological Science and Technology, Takasaki, Gunma, Japan; A. KURAMATA, S. YAMAKOSHI, Tamura Corp., Sayama, Saitama, Japan; H. MURAKAMI, Y. KUMAGAI, Tokyo University of Agriculture and Technology, Koganei, Tokyo, Japan; M. HIGASHIWAKI, National Institute of Information and Communications Technology, Koganei, Tokyo, Japan

SYMPOSIUM FK
MATERIALS CHALLENGES FOR
SUSTAINABLE NUCLEAR FISSION AND
FUSION TECHNOLOGIES

Session FK-1

Structural Components for Nuclear Fission and Fusion Applications

FK-1:IL01 Novel Materials and Advanced Design Concepts for DEMO Divertor Targets

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FK-1:IL02 High-temperature Fracture Behaviour of High Chromium Ferritic-martensitic and Nanostructured Ferritic Alloys

THAK SANG BYUN, JUNG PYUNG CHOI, Pacific Northwest National Laboratory, Richland, WA, USA; D.T. HOELZER, Oak Ridge National Laboratory, Oak Ridge, TN, USA; S.A. MALOY, Los Alamos National Laboratory, Los Alamos, NM, USA

FK-1:IL03 Challenges in the Development of Structural Materials for Fluctuating Loading Conditions

B. KUHN, T. FISCHER, J. LOPEZ BARRILAO, Forschungszentrum Jülich GmbH, Jülich, Germany

FK-1:IL04 Tungsten Powder Injection Molding @ KIT: Achievements and Trends

S. ANTUSCH, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, Germany

FK-1:IL05 The Theory of Precipitation Hardening Revisited: The Effect of Crystal Structure on the Obstacle Strength

YOSHITAKA MATSUKAWA, Tohoku University, Sendai, Japan

FK-1:IL06 Improvement of Density and Strength of CVI-processed SiC/SiC Composites by Applying SiC Nanowires

DAEJONG KIM, HO WOOK LEE, SEUNGHO LEE, HYEON-GEUN LEE, JI YEON PARK, WOEN-JU KIM, Korea Atomic Energy Research Institute, Daejeon, South Korea

FK-1:IL07 Development of the Nanostructured Ferritic Alloy OFRAC (Fe-12Cr-MoTiNb) for Fast Reactor Advanced Fuel Cladding

D.T. HOELZER, C.P. MASSEY, K.A. TERRANI, Oak Ridge National Laboratory, Oak Ridge, TN, USA

FK-1:IL08 Microstructural Evolution of Oxide Dispersion Strengthened Alloys under Temperature and Stress

JINSUNG JANG, TAE KYU KIM, WOO GON KIM, CHANG HEE HAN, Korea Atomic Energy Research Institute, South Korea; XIAODONG MAO, Institute of Nuclear Energy Safety Technology, CAS, China; MAN WANG, HEUNG NAM HAN, Seoul National University, South Korea

Session FK-2

Low Activation Structural Materials for Nuclear Fusion Systems

FK-2:IL01 Hydrogen Isotope Retention in Low-activation Structural Materials

A.V. SPITSYN, N.P. BOBYR, A.V. GOLUBEVA, NRC Kurchatov Institute, Moscow, Russia; V.M. CHERNOV, VNIINM, Moscow; Russia

FK-2:IL02 Expanding the Operation Window of RAFM Steels by Optimized Chemical Compositions and Heat Treatments

J. HOFFMANN, M. RIETH, M. KLIMENKOV, S. BAUMGÄRTNER, Karlsruhe Institute of Technology, Karlsruhe, Germany

FK-2:IL03 Sputter-erosion of Low-activation Steel

M. OBERKOFER¹, R. ARREDONDO PARRA¹, M. BALDEN¹, S. ELGETI¹, H. GREUNER¹, W. JACOB¹, M. MAYER¹, R. NEU¹, T. SCHWARZ-SELINGER¹, T.F. SILVA^{1,2}, KAZUYOSHI SUGIYAMA¹, U. VON TOUSSAINT¹, ¹Max Planck Institute for Plasma Physics, Garching, Germany; ²Instituto de Física da Universidade de São Paulo, São Paulo, Brazil

FK-2:LO4 Treatment of Constructional Materials of Fuel Rod Cladding and Fuel Assemblies in the Processing of Spent Nuclear Fuel of the Reactor Facility Brest-300

V. KASCHEEV, High-Tech Institute of Inorganic Materials, Moscow, Russia

Session FK-3

Materials for First Wall Components of Nuclear Fusion Systems

FK-3:IL01 Tungsten Materials for Plasma Facing Components - Status and Research Directions

CH HENAGER Jr., RJ KURTZ, BN NGUYEN, PNNL, Richland, WA, USA; GR ODETTE, UCSB, Santa Barbara, CA, USA

FK-3:IL02 Advanced Tungsten Materials for Plasma-facing Components of Future Fusion Devices

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FK-3:IL03 Tungsten Alloys for Reduced Oxidation under Accident Conditions in Fusion

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FK-3:IL04 Conclusions drawn from Plasma Operation with Beryllium and Tungsten Plasma-facing Components in JET and Linear Plasma Devices

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FK-3:IL05 Overview of a Comprehensive First Mirror Test in the JET Tokamak for ITER

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FK-3:IL06 New Materials and Composites for Fusion Reactor First Wall Components

Ch. LINSMEIER, J.W. COENEN, J. RIESCH*, M. BRAM, J. ENGELS, S. HEUER, A. HOUBEN, B. JASPER, F. KLEIN, A. LITNOVSKY, Y. MAO, G. PINTSUK, L. RAUMANN, M. RASINSKI, J. SCHMITZ, X. TAN, T. WEGENER, Forschungszentrum Jülich GmbH, Institut für Energie- und Klimaforschung - Plasmaphysik, Partner of the Trilateral Euregio Cluster, Jülich, Germany; *Max-Planck-Institut für Plasmaphysik, Garching, Germany

Session FK-4

Functional Materials

FK-4:LO1 Uranium Intermetallic Compounds with Superb Hydrogen Absorbability

MICHIO YAMAWAKI, T. YAMAMOTO, Y. ARITA, T. ONITSUKA, B. TSUCHIYA, University of Fukui, Tsuruga, Fukui, Japan

Session FK-5

Nuclear Fuel Materials

FK-5:IL01 Development of MA-Zr Hydride for Transmutation of Nuclear Wastes by Fast Reactor

KENJI KONASHI¹, M. HIRAI², H. MUTA³, K. KUROSAKI³, K. ITOH⁴, K. IKEDA⁵, M. YAMAWAKI⁶, ¹Inst. for Materials Research, Tohoku University, Oarai, Ibaraki-ken, Japan; ²Nippon Nuclear Fuel Development Co. Ltd., Oarai, Ibaraki-ken, Japan; ³Div. of Sustainable Energy and Environmental Engineering, Osaka Univ., Suita, Osaka-fu, Japan; ⁴Nuclear Development Corp., Tokai-mura, Ibaraki-ken, Japan; ⁵Mitsubishi FBR Systems, Inc., Shibuya, Tokyo, Japan; ⁶Research Inst. of Nuclear Engineering, Univ. of Fukui, Tsuruga, Fukui, Japan

FK-5:L02 Study of Dissolution Mechanisms for Mixed Actinides Oxides
N. DACHEUX, S. SZENKNECT, L. CLAPAREDE, N. CLAVIER, A. MESBAH, R. PODOR, ICSM UMR 5257, France, P. MOISY, CEA Marcoule, France

FK-5:L03 Impact of PGM Particles during the Dissolution of Uranium Dioxide

L. CLAPAREDE, T. CORDARA, S. SZENKNECT, A. MESBAH, R. PODOR, N. DACHEUX, ICSM UMR5257, France, C. LAVALETTE, AREVA NC, Paris, France

FK-5:L04 Response of Commercial MAX-phases to Neutron Irradiation to Intermediate Fluences

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FK-5:L05 Hydrothermal Precipitation of Morphology-controlled Actinide Dioxides

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FK-5:L06 High Temperature X-Ray Diffraction Studies of Surrogates for Americium Oxides

E.J. WATKINSON, R.M. AMBROSI, J. NAJORKA, Department of Physics and Astronomy, University of Leicester, Leicester, UK; Natural History Museum, London, UK

FK-5:L07 Conversion of Surrogate and Uranium Oxide by Solution Combustion Synthesis

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FK-5:L08 Electron Irradiation Damage in Fluorite-type Oxides

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FK-5:L09 Dissolution of Uranium Thorium Mixed Oxides: The Role of Nitrous Acid

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FK-5:L10 Zirconium Carbide (ZrC) for High Temperature Nuclear Environments - Probing the Local Structure using NMR

DHAN-SHAM RANA, I. FARNAN, Department of Earth Sciences, University of Cambridge, Cambridge, UK

Session FK-6 Radiation Effects

FK-6:IL01 A Real Space Multiscale Model for the Deformation and Swelling of Components under High-energy Neutron Irradiation

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FK-6:IL02 Hydrogen Isotope Retention in Neutron-irradiated Tungsten Exposed to High Flux Plasma

MASASHI SHIMADA, Idaho National Laboratory, Idaho Falls, ID, USA

FK-6:IL03 Pancake-like Growth and Coalescence of Intergranular Helium Bubbles: In situ Observation and Analytical Modelling

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FK-6:IL04 Radiation Effects and Defect Production in SiC and SiC/SiC Composites

W.J. WEBER, S. AGARWAL, University of Tennessee, Knoxville, TN, USA; YANWEN ZHANG, Oak Ridge National Laboratory, Oak Ridge, TN, USA

FK-6:IL05 New Conceptual Advances in Diffusion-mediated Modelling of Dislocation-driven Evolution of Radiation Effects in Fission and Fusion Materials

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FK-6:IL06 In situ Ion Irradiation Induced Detwinning in Naotwinned Cu Films

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FK-6:L07 Radiolytic Damage and Hydrogen Generation at Carbide - Water Interfaces

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FK-6:L08 Behaviour of Spent Nuclear Fuel during Long-term Storage: Accelerated Radiation Damage with 238Pu-doped UO2

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FK-6:L09 Are Mesoporous Silica Radiation Tolerant?

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FK-5:IL10 Effect of Irradiation Defects on SiC Dissolution in Hot Water

SOSUKE KONDO, YUKI MAEDA, KAZUHIRO FUKAMI, SHINICHIRO MOURI, TATSUYA HINOKI, Kyoto University, Uji, Kyoto, Japan

FK-6:L11 Sink Strengths of Microstructure Elements for Radiation Defects in bcc (Fe, V) and fcc (Cu) Metals

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FK-6:L12 Helium Precipitation Study in UO2 by Transmission Electron Microscopy

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FK-6:L13 Degradation of Zr Microstructure under Operation as Part of Fuel Assemblies of VVER-type Reactors

B.A. GUROVICH, E.A. KULESHOVA, **A.S. FROLOV**, D.A. MALTSEV, D.A. ZHURKO, D.V. SAFONOV, E.V. KRIKUN, NRC KI, Moscow, Russia

FK-6:L14 Electronic Structure Calculations of Structural, Electronic, Thermodynamic and Defect Properties in Mixed Uranium-plutonium Oxides (U,Pu)O2

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Session FK-7 Materials Modelling and Database

FK-7:IL01 Modeling Microstructural Evolution in Tungsten Under Fusion Irradiation Conditions

J. MARIAN, University of California Los Angeles, CA, USA

FK-7:IL02 A Large Scale Database of Cascade Configurations: A New Paradigm in Multi-scale Modelling of Radiation Damage Effects in Nuclear Materials

A.E. SAND, University of Helsinki, Helsinki, Finland; S.L. DUDAREV, CCFE, Culham Science Centre, Abingdon, UK

FK-7:L03 EUROFER97 Ratcheting Behavior at 450 & 550°C and their Modelling

KUO ZHANG, JARIR AKTAA, Karlsruhe Institute of Technology (KIT), Institute for Applied Materials, Eggenstein-Leopoldshafen, Germany

FK-7:IL04 Modelling the Thermophysical and -mechanical Properties of Tungsten Fibre-reinforced Copper Metal Matrix Composites by means of Mean Field Homogenisation

A.VON MÜLLER, M. LI, R. NEU, J.H. YOU, Max-Planck-Institut für Plasmaphysik, Garching, Germany

FK-7:IL05 Phase Field Modeling of Irradiation-induced Void and He Bubble Formation in Metals

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FK-7:IL06 Structural Steels for DEMO and Fusion Power Plants

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Session FK-8

Crosscutting Materials Issues for Nuclear Fission and Fusion Systems

FK-8:IL01 Low Activation Structural Materials for Nuclear Fission and Fusion Reactors - the RF R&D

V.M. CHERNOV, M.V. LEONTIEVA-SMIRNOVA, A.A. BOCHVAR, High-technology Research Institute of Inorganic Materials, Moscow, Russia

FK-8:IL02 Challenges of Simulating Neutron-induced Radiation Damage Using Ion Beams

G.S. WAS, University of Michigan, Ann Arbor, MI, USA

Focused Session FK-10

MATERIALS ISSUES IN NUCLEAR WASTE TREATMENT AND DISPOSAL

Session FK-10.1

Waste Form Development

FK-10.1:IL01 Recent Advances in the Immobilization of Low- or Intermediate-level Radioactive Waste in Cementitious Materials

C. CAU DIT COUMES, J.B. CHAMPENOIS, A. POULESQUEN, D. LAMBERTIN, CEA, DEN, DE2D, SEAD, Bagnols-sur-Cèze, France

FK-10.1:IL02 Phosphate-based Glasses and Glass Ceramics for Immobilization of Lanthanides and Actinides

S.V. STEFANOVSKY, O.I. STEFANOVSKY, Frumkin Institute of Physical Chemistry and Electrochemistry RAS, Moscow, Russia; S.E. VINOKUROV, Vernadsky Institute of Geochemistry and Analytical Chemistry RAS, Russia

FK-10.1:IL03 Synthesis and Thermal Behavior of Thorium-incorporated Rhabdophane

DANWEN QIN, A. MESBAH, S. SZENKNECT, N. CLAVIER, N. DACHEUX, Institut de Chimie Séparative de Marcoule, Bagnols sur Cèze Cedex, France

FK-10.1:IL04 Immobilization of Fission Products in Glass and Glass Ceramic Matrices

S. SCHULLER, E. REGNIER, J. FOURNIER-RENAUD, H. PABLO, CEA, DEN, DE2D, SEVT, Bagnols-sur-Cèze, France

FK-10.1:IL05 Using Plasma Technology as New Proven Developments for Thermal Treatment of Problematic and Radioactive Waste

J. DECKERS, Belgoprocess, Dessel, Belgium

FK-10.1:IL06 Thorium Incorporation in the Xenotime Based Ceramic

A. MESBAH¹, N. CLAVIER¹, S. SZENKNECT¹, J. LOZANO-RODRIGUEZ², N. DACHEUX¹, ¹ICSM, UMR 5257 CNRS - CEA - ENSCM - Université de Montpellier, Site de Marcoule - Bat 426, Bagnols/Cèze, France; ²HZDR, Institute of Resource Ecology, the Rossendorf Beamline at ESRF, Grenoble, France

Session FK-10.2

Challenging Waste Constituents

FK-10.2:IL01 X-Ray Diffraction and Adsorption Spectra Reveal Zr and Ti Coordination Environment in Actinides Immobilization by Glass-Ceramics

CHANGZHONG LIAO, KAIMIN SHIH, Department of Civil Engineering, The University of Hong Kong, Hong Kong SAR, China

FK-10.2:IL02 Recovery of Actinides from Nuclear Waste Using Pyro-electrochemical Process

WEIQUN SHI, Laboratory of Nuclear Energy Chemistry, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, China

FK-10.2:IL03 Disposal of Radioactive Mercury Wastes from the Decommissioning of Nuclear Facilities

L. KLASS, P. RITZ, N. SHCHERBINA, A. WILDEN, G. MODOLO, D. BOSBACH, Forschungszentrum Jülich GmbH, Jülich, NRW, Germany; M. HIRSCH, J. KETTLER, A. HAVENITH, Aachen Institute for Nuclear Training GmbH, Stolberg, NRW, Germany

FK-10.2:IL04 Removal of Noble Metals from High Level Liquid Waste by Silica-based Anion Exchangers

YUEZHOU WEI, X. WANG, S. NING, Guangxi University, Nanning, China; Y. WU, Q. ZOU, Shanghai Jiao Tong University, Shanghai, China

FK-10.2:IL05 Study of the Hydrothermal Synthesis of ThSiO₄, USiO₄ and CeSiO₄ Aiming at Determining the Conditions of PuSiO₄ Formation
P. ESTEVENON¹, E. WELCOMME¹, S. SZENKNECT², A. MESBAH², P. MOISY³, C. POINSSOT³, N. DACHEUX², ¹CEA/DEN/DMRC/SFMA/LPCA, CEA Marcoule - Bat 399, Bagnols-sur-Cèze cedex, France; ²ICSM, UMR 5257 CEA/CNRS/UM/ENSCM, Site de Marcoule - Bat 426, Bagnols-sur-Cèze cedex, France; ³CEA/DEN/DMRC/DIR, CEA Marcoule - Bat 400, Bagnols-sur-Cèze cedex, France

Session FK-10.3

Waste Form Performance Testing, and Characterization

FK-10.3:IL01 Modern Irradiation Testing Techniques to Simulate the Irradiation Performance of Waste Forms

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FK-10.3:IL02 Impact of Near Field Evolution on the Stability of Vitrified Waste and Spent Nuclear Fuel

K. LEMMENS, C. CACHOIR, K. FERRAND, T. MENNECART, S. CAES, E. VALCKE, Belgian Nuclear Research Centre, Mol, Belgium

FK-10.3:IL03 Synchrotron-based Three-dimensional X-ray Imaging of Crystalline Ceramic Waste Form Materials

WILSON K.S. CHIU, Department of Mechanical Engineering, University of Connecticut, Storrs, CT, USA

Session FK-10.4

Waste Immobilization Facilities and Repository Design

FK-10.4:IL01 International Experience in Radioactive Waste Vitrification
M.I. OJOVAN, R.A. ROBBINS, International Atomic Energy Agency (IAEA), Vienna, Austria

FK-10.4:IL02 Toward the Design and Operation of a Full Scale Hot Isostatic Pressing Facility for Radioactive Waste Conditioning
P.G. HEATH, S. MORICCA, M.W.A. STEWART, S. CHUNG, GRI Inc, Lewes, DE, USA

FK-10.4:IL03 Towards a Safety Case for the French Repository
B. GRAMBOW, SUBATECH (IMT Atlantique, University of Nantes, CNRS), Nantes, France

SYMPOSIUM FL

BIOLOGICAL, BIOHYBRID AND BIOINSPIRED MATERIALS: FROM ELECTRONICS AND PHOTONICS TO MEDICINE

Session FL-1

Classes of Materials and their Synthesis and Chemical Modification

FL-1:IL01 Biopolymer based Electrodes for Wooden Batteries and Super Capacitors

O. INGANAS, Biomolecular and organic electronics, Dept. Physics, Chemistry and Biology, Linköpings Universitet, Linköping, Sweden

FL-1:IL02 Biosilica from Diatoms: Smart Materials from Biomedicine to Photonics

R. RAGNI, Dipartimento di Chimica, Università degli Studi di Bari "Aldo Moro", Bari, Italy

FL-1:IL03 Mussel and Plant Polyphenol Inspired Materials: From Molecular Phenomena to Applications

P.B. MESSERSMITH, University of California, Berkeley, CA, USA

FL-1:IL04 Molecular Bases of Cadherin-mediated Cell-cell Adhesion

E. PARISINI, Center for Nano Science and Technology @Polimi, Istituto Italiano di Tecnologia, Milano, Italy

FL-1:IL05 Synthesis and Characterization of Micro- and Nanostructured Surfaces for Controlling Selective Cell Response

C. AKTAS, AYMAN HAIDAR, MICHAEL VEITH, FRANZ FAUPEL, HASHIM ABDUL-KHALIQ, Kiel, Germany

FL-1:IL06 Photosynthetic Enzymes as Photoactive Soft Materials

F. MILANO, S. LA GATTA, A. AGOSTIANO, M. DELL'EDERA, R. RAGNI, G.M. FARINOLA, **M. TROTTA**, Istituto per i Processi Chimico Fisici - CNR - Bari; Dipartimento di Chimica, Università di Bari, Bari, Italy

FL-1:IL07 Investigation of Leaf Shape and Edge Design for Faster Evaporation in Biomimetic Heat Dissipation Systems

P. GRUBER, A. RUPP, University of Akron, Biomimicry Research and Innovation Center BRIC, Akron, OH, USA

FL-1:IL08 Polymer Brushes Grafted into Supported Porous Oxide Films Generating 3-D Non-fouling Surfaces

M. ES-SOUNI, Institute for Materials & Surface Technology, Kiel University of Applied Sciences, Kiel, Germany

FL-1:IL09 Biophotonic Sensors Based on the Comb Structure in the Ctenophora Species

P. MACHA, J. MOLINSKI, Y. HAMEDANI, M.C. VASUDEV, University of Massachusetts Dartmouth, MA, USA

FL-1:IL10 From Melanins to OLED Devices: Designing Electroluminescent Materials Inspired to Human Pigments

P. MANINI, C.T. PRONTERA, V. CRISCUOLO, A. PEZZELLA, O. CRESCENZI, M. PAVONE, M. D'ISCHIA, Department of Chemical Science, University of Naples Federico II, Napoli, Italy; M.G. MAGLIONE, P. TASSINI, C. MINARINI, Lab. Nanomaterials and Devices, ENEA C.R. Portici, Portici, Italy

FL-1:IL11 Bioinspired Self-organization of Functional Materials

L. HELMBRECHT, H.C. HENDRIKSE, A. VAN DER WEIJDEN, **W.L. NOORDUIN**, AMOLF, Amsterdam, The Netherlands

Session FL-2

Electronic Devices with Biological and Bio-inspired Materials

FL-2:IL01 Self-organized and Self-assembled Organic Bioelectronics for Applications in Medicine and Plant Biology

M. BERGGREN, Laboratory of Organic Electronics, Linköping University, Norrköping, Sweden

FL-2:IL02 Electronic Interface with Plants

E. STAVRINIDOU, Linköping University, Norrköping, Sweden

Session FL-3

Photonic Devices with Biological and Bio-inspired Materials

FL-3:IL01 Photonic Crystals Composed of 99% Water and 1% Inorganic Nanosheet

YASUHIRO ISHIDA, RIKEN Center for Emergent Matter Science, Japan

FL-3:IL02 Biologically Inspired Soft and Fluid Optical Materials

M. KOLLE, S. NAGELBERG, J. SANDT, Massachusetts Institute of Technology, Cambridge, MA, USA

FL-3:IL03 Light Emission from Speleothems and Biospeleothems

R.J. MARTIN-PALMA¹, H. CABRERA^{2,3}, C. BREWER-CARIÁS⁴, ¹Departamento de Física Aplicada, Universidad Autónoma de Madrid, Madrid, Spain; ²Centro Multidisciplinario de Ciencias, Instituto Venezolano de Investigaciones Científicas, Mérida, Venezuela; ³SPIE-ICTP Anchor Research in Optics Program Laboratory, International Centre for Theoretical Physics, Trieste, Italy; ⁴Sociedad Venezolana de Ciencias Naturales, Caracas, Venezuela

FL-3:IL04 Fluorescent Proteins and Carbon Nanotubes: Unconventional Materials for Strong Light-matter Interaction and Solid-state Lasers

C. DIETRICH^{1,2}, A. GRAF^{1,3}, L. TROPF¹, M. KARL¹, A. KÄMPF¹, M. SCHUBERT¹, N.M. KRONENBERG¹, Y. ZAKHARKO³, S. HÖFLING^{1,2}, J. ZAUMSEIL³, **M.C. GATHER**¹, ¹School of Physics and Astronomy, University of St Andrews, St Andrews, UK; ²Technische Physik, Universität Würzburg, Würzburg, Germany; ³Institute for Physical Chemistry, Universität Heidelberg, Heidelberg, Germany

FL-3:IL05 Morpho-colored Materials having High Reflectance in Wide Angle without Color-change: Large-area Duplication using Flexible Mold

AKIRA SAITO, KOSEI ISHIBASHI, JUNPEI OHGA, MIDORI FUKIHARA, YUJI KUWAHARA, Osaka Univ. and Riken Harima Institute (SPRING-8), Suita-Si, Osaka, Japan

FL-3:IL06 Peptide Integrated Optics: From Optical Waveguides To Implantable BioChips

G. ROSENMAN, N. LAPSHINA, School of Electrical Engineering, Faculty of Engineering, Tel Aviv University, Israel; B. APTER, A. HANDEMAN, Faculty of Engineering, Holon Institute of Technology, Holon, Israel

FL-3:IL07 Circular Polarization Reflections from Beetles - What do they tell us?

K. WEIR, Blackett Laboratory, Department of Physics, Imperial College London, London, UK

FL-3:IL08 Lasers and Optical Cavities Made out of Biological Materials

M. HUMAR, J. Stefan Institute, Ljubljana, Slovenia; and Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia

FL-3:IL09 Up-scaling of Bio-inspired Polymer Films for Optical Applications

F. VÜLLERS, S. SCHAUER, J. SYURIK, M. KAVALENKA, **H. HÖLSCHER**, Karlsruhe Institute of Technology, Karlsruhe, Germany

FL-3:IL10 Structural Colours in Plants: Mechanisms and Functions

S. VIGNOLINI, Department of Chemistry, University of Cambridge, Cambridge, UK

FL-3:IL11 Bioabsorbable Polymer Optical Waveguides for Deep-tissue Photomedicine

S. NIZAMOGU, Koc University, Istanbul, Turkey

Session FL-4

Bio-medical Devices with Biological and Bio-inspired Materials

FL-4:IL01 Optoelectronic Cellular Interfaces with Nanocrystalline Organic Semiconductors

E.D. GLOWACKI, Laboratory of Organic Electronics, Physics and Electronics Division, Linköping University, Norrköping, Sweden

FL-4:IL02 Phostimulation of Semiconducting Nanoparticles to Control Physiological Functions In Vivo

M. MOROS¹, M.R. ANTOGNAZZA², C. BOSSIO², G. ONORATO¹, A. BAUDUIN³, V. MARCHESANO¹, M. ZANGOLI³, A. TINO¹, G. LANZANI², **C. TORTIGLIONE**¹, ¹Istituto di Scienze Applicate e Sistemi Intelligenti "E. Caianiello", CNR, Pozzuoli, Italy; ²Center for Nano Science and Technology@PoliMi, Istituto Italiano di Tecnologia, Italy; ³Istituto per la Sintesi Organica e la Fotoreattività, CNR, Italy

FL-4:IL03 Bioengineering Fluorescent Conductive Microfibrils in Vivo

M. MOROS^{1,2}, F. DI MARIA³, P. DARDANO⁴, M. ZANGOLI³, G. ONORATO², A. BAUDUIN², A. TINO², L. DESTEFANO⁴, G. BARBARELLA³, C. TORTIGLIONE², ¹Aragon Materials Science Institute, CSIC, Zaragoza, Spain; ²Istituto di Scienze Applicate e Sistemi Intelligenti "E. Caianiello", CNR, Napoli, Italy; ³Istituto per la Sintesi Organica e la Fotoreattività, CNR, Bologna, Italy; ⁴Istituto di Microelettronica e Microsistemi, CNR, Napoli, Italy

FL-4:IL04 Hematite Particles Covered by Porous Alumina for Magnetic Induced Hyperthermia and Cancer Drug Release

N.N. ZURITA MENDEZ, M.A. ESPINOSA-MEDINA, G. CARBAJAL-DE LA TORRE, Programa de Doctorado en Ciencias en Ingeniería Mecánica, FIM-UMSNH, Morelia, Michoacán, México; Laboratorio de Materiales, Facultad de Ingeniería Mecánica, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México

FL-4:IL05 Bio-inspired Electronic and Photonic Devices in Biomedical Sensing

L.A. FRANCIS, Université catholique de Louvain, ICTEAM Institute, Electrical Engineering Department, Louvain-la-Neuve, Belgium

FL-4:IL06 Tailoring Conducting Polymer Scaffolds for Bioelectronics

S. INAL, Biological and Environmental Science and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

FL-4:IL07 Biomimetic Microfluidics based on Stimuli-responsive Soft Polymers

D. DIAMOND, A. DUNNE, D. BRUEN, C. DELANEY, P. MCCLUSKEY, M. MCCAUL, L. FLOREA, INSIGHT Centre for Data Analytics, National Centre for Sensor Research, Dublin City University, Dublin, Ireland

FL-4:IL08 Heat Effect of Nanoparticles for Biotechnological Applications

J.M. DE LA FUENTE, Institute of Materials Science of Aragón, Zaragoza, Spain

FM - 3rd International Conference
EMERGING MATERIALS,
TECHNOLOGIES AND APPLICATIONS
FOR NON-VOLATILE MEMORY DEVICES

Session FM-1

Magnetic, Ferroelectric and Multiferroic Materials for Memory Devices

FM-1:IL01 NVM Technologies Based on Ferroelectric Hafnium Oxide
T. MIKOLAJICK^{1,2}, T. SCHENK¹, T. MITTMANN¹, M. HOFFMANN¹, B. MAX², C. RICHTER¹, M. PESIC¹, F. FENGLER¹, H. MULAOSMANOVIC¹, M.-H. PARK¹, S. SLESAZECK¹, U. SCHROEDER¹, J. MÜLLER³, P. POLAKOWSKI³, S. MÜLLER⁴, R. MATERLIK⁵, A. KERSCH⁵, ¹NaMLab gGmbH, Dresden, Germany; ²Chair of Nanoelectronic Materials, TU Dresden, Dresden, Germany; ³Fraunhofer IPMS-CNT, Dresden; ⁴FMC GmbH, Dresden, Germany; ⁵Munich University of Applied Sciences, Munich, Germany

FM-1:IL02 Magnetolectric Coupling at Ferromagnet/Ferroelectric-HfO₂ Interface
A. ZENKEVICH¹, Y. MATVEYEV¹, V. MIKHEEV¹, R. MANTOVAN², A.I. CHUMAKOV³, ¹Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russia; ²CNR-IMM Laboratorio MDM, Agrate Brianza (MB), Italy; ³ESRF-The European Synchrotron CS40220, Grenoble Cedex, France

FM-1:IL03 Effect of Polarization Reversal on the Potential Distribution Across Ferroelectric HfO₂ based Capacitors Revealed in Operando by Hard x-ray Photoemission Spectroscopy
Y. MATVEYEV¹, D. NEGROV¹, V. MIKHEEV¹, A. CHERNIKOVA¹, A. ZENKEVICH¹, Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russia; A. GLOSKOVSKII, Deutsches Elektronen-Synchrotron, Hamburg, Germany

FM-1:IL04 Ferroelectric Tunnelling Junctions for Memcomputing
M. ASA, C. RINALDI, S. VAROTTO, M. CANTONI, **R. BERTACCO**, Department of Physics, Politecnico di Milano, Milano, Italy

FM-1:IL05 Ultrafast MRAM Strategies for Cache Applications and Beyond
I.L. PREJBEANU¹, A. TIMOPHEEV¹, M. MIRON¹, G. GAUDIN¹, B. LACOSTE¹, T. DEVOLDER², M. MARINS DE CASTRO¹, R.C. SOUSA¹, L.D. BUDA-PREJBEANU¹, S. AUFFRET¹, U. EBELS¹, B. RODMACQ¹, B. DIENY¹, ¹Univ. Grenoble Alpes, CEA, CNRS, INAC-Spintec, Grenoble, France; ²Univ. Paris-Sud, Orsay, France

FM-1:IL06 Sub-ns Current-induced Magnetization Switching Driven by Spin-orbit Torques
P. GAMBARELLA, Department of Materials, ETH Zürich, Switzerland

FM-1:IL07 Electric-field Controlled Nucleation of Magnetic Skyrmions at Room Temperature
T. SRIVASTAVA, M. SCHOTT, A. HALLAL, M. CHSHIEV, S. AUFFRET, C. BARADUC, **H. BEA**, Univ. Grenoble Alpes, CEA, CNRS, Grenoble INPi, INAC, SPINTEC, Grenoble, France; M. SCHOTT, A. BERNAND-MANTEL, L. RANNO, V. KRIZAKOVA, S. PIZZINI, D. GIVORD, Institut NEEL/CNRS/UGA-Grenoble/ Grenoble-INP, France

FM-1:IL08 Role of Curie Temperature on Thermal Stability Limits of Perpendicular STT-MRAM
L. TILLIE^{1,2}, R.C. SOUSA², J. CHATTERJEE², S. AUFFRET², N. LAMARD², J. GUELFUCCI², E. NOWAK¹, B. DIENY², I-L. PREJBEANU², ¹CEA-LETI, Minatex Campus, Grenoble, France; ²SPINTEC, Univ. Grenoble Alpes/CEA/CNRS, Grenoble, France

FM-1:IL09 Field-free spin Hall Switching of Perpendicular Magnetization through Voltage Modulation
SHOUZHONG PENG^{1,2}, WANG KANG¹, SAI LI¹, XIANG LI², JIAQI ZHOU¹, NA LEI¹, YOUGUANG ZHANG¹, HONGXIN YANG³, PEDRAM KHALILI AMIRI², KANG L. WANG², **WEISHENG ZHAO¹**, ¹Fert Beijing Institute, BDBC, School of Electronic and Information Engineering, Beihang University, Beijing, China; ²Department of Electrical Engineering, University of California, Los Angeles, CA, USA; ³Key Laboratory of Magnetic Materials and Devices, Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo, China

FM-1:IL10 Negative Capacitance: Theory, Practice and Limitations
Y.J. KIM, M.H. PARK, **CHEOL SEONG HWANG**, Department of Material Science & Engineering and Inter-University Semiconductor Research Center, Seoul National University, Seoul, South Korea

FM-1:IL11 Magnetic Polarons in Strongly Correlated Materials for Spintronic Applications

V.G. STORCHAK, National Research Center "Kurchatov Institute", Moscow, Russia

FM-1:IL12 Self-assembled Network of Nanostructures in BiFeO₃ Thin Films

B. COLSON, V. FUENTES, C. FRONTERA, F. SANDIUMENGE, LL. BALCELLS, B. MARTINEZ, A. POMAR, ICMA-B-CSIC, Campus UAB, Bellaterra, Spain; D. COLSON, M. VIRET, A. FORGET, SPEC/IRASMIS/ DSM, CEA-Saclay, Gif-sur Yvette, France; J. SANTISO, ICN2, CSIC, BIST, Campus UAB, Bellaterra, Spain; **Z. KONSTANTINOVIC**, N. LAZAREVIC, M. SCEPANOVIC, Z.V. POPOVIC, CSSPNM, Institute of Physics Belgrade, University of Belgrade, Serbia

Session FM-2

Resistance Switching (RRAM) and Phase Change (PCM) Memories

FM-2:IL01 Simplified Resistive Memory for CMOS Integration

M.N. KOZICKI, School of Electrical, Computer and Energy Engineering, Arizona State University, Tempe, AZ, USA

FM-2:IL02 Impact of the Transistor Current Control on the Multiple Resistive Switching Properties in 1T1R RRAM Devices

E. PEREZ, M.K. MAHADEVAIAH, Ch. WENGER, IHP, Frankfurt (Oder), Germany; C. ZAMBELLI, P. OLIVO, Università degli Studi di Ferrara, Ferrara, Italy

FM-2:IL03 Atomic Layer Deposition of Oxygen Deficient TaOx Dielectrics for Resistive Switching Memory Applications

A.M. MARKEEV¹, K.V. EGOROV¹, D.S. KUZMICHEV¹, D.I. MYKOTA¹, V.A. GRITSENKO², T.V. PEREVALOV², C.S. HWANG^{1,3}, ¹Moscow Institute of Physics and Technology, Dolgoprudny, Moscow region, Russia; ²Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk, Russia; ³Department of Materials Science and Engineering and Inter-University Semiconductor Research Center, Seoul National University, Seoul, South Korea

FM-2:IL04 Tuning the Switching Properties of ZnO Thin Film Memristors by Al Doping via ALD

C. GIOVINAZZO, C. RICCIARDI, S. PORRO, Politecnico di Torino, Department of Applied Science and Technology, Torino, Italy

FM-2:IL05 Resistive Memory Technology and Applications

H.J. BARNABY, School of Electrical, Computer and Energy Engineering Arizona State University, Tempe, AZ, USA

FM-2:IL06 Dynamics of the Electroforming Process of Valence Change Memory Cells

S. MENZEL¹, A. MARCHEWKA², T. HEISIG¹, C. BÄUMER¹, R. DITTMANN¹, R. WASER^{1,2}, ¹Forschungszentrum Jülich, Peter Grünberg Institut (PGI-7), Jülich, Germany; ²RWTH Aachen, Institut für Werkstoffe der Elektrotechnik (IWE 2), Aachen, Germany

FM-2:IL07 Effect of Heavy Ion Radiation on Resistive Switching in HfOx based RRAM Devices Grown by MBE

S. PETZOLD¹, S.U. SHARATH¹, J. LEMKE¹, E. HILDEBRANDT¹, C. TRAUTMANN², L. ALFF¹, ¹Institute of Materials Science, Technische Universität Darmstadt, Darmstadt, Germany; ²Materials Research Department, Gesellschaft für Schwerionenforschung (GSI), Darmstadt, Germany

FM-2:IL08 Nonvolatile Impedance Switching in Electroforming-free BFO Memristors

M. KIANI^{1,4}, NAN DU^{1,4}, N. MANJUNATH¹, D. BÜRGER^{1,4}, I. SKORUPA^{1,3}, S.E. SCHULZ^{2,6}, O.G. SCHMIDT^{1,2}, H. SCHMIDT^{1,4,5}, ¹Materials systems for Nanoelectronics, Chemnitz University of Technology, Chemnitz, Germany; ²Institute for Integrative Nanosciences, IFW Dresden, Dresden, Germany; ³Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, Dresden, Germany; ⁴Fraunhofer-Institut für Elektronische Nanosysteme, Abteilung Back-End of Line, Chemnitz, Germany; ⁵Leibniz-Institut für Photonische Technologien e.V., Jena, Germany; ⁶Chemnitz University of Technology, Center for Microtechnologies, Chemnitz, Germany

FM-2:IL09 Resistive Switching Modes and Dynamics in Defect Engineered Polycrystalline HfOx based RRAM Devices

S.U. SHARATH¹, S. PETZOLD¹, E. HILDEBRANDT¹, J. KURIAN¹, P. KOMISSINSKIY¹, C. WENGER², T. SCHROEDER^{2,3}, L. ALFF¹, ¹Institute of Materials Science, TU Darmstadt, Darmstadt, Germany; ²IHP, Frankfurt (Oder), Germany; ³Brandenburgische Technische Universität, Cottbus, Germany

FM-2:IL10 Mechanisms and Nanoscale Processes in Resistive Switching Memories

I. VALOV, Research Centre Juelich, Electronic Materials (PGI-7), Juelich, Germany

FM-2:L11 MIS Structures with Interfacial Graphene for RRAM Applications: A Nanoscale and Device Level Characterization
S. CLARAMUNT, QIAN WU, M. PORTI, M. NAFRIA, X. AYMERICH, Electronic Engineering Dept., Universitat Autònoma de Barcelona, Bellaterra, Spain

FM-2:L12 An Electrochemical Metallization Memory Cell Based on a Single ZnO Nanowire

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FM-2:L13 Non-volatile Resistive Switching in Yttrium Manganite Thin Films

V.R. RAYAPATI¹, NAN DU¹, D. BÜRGER¹, R. PATRA¹, I. SKORUPA², H. STÖCKER³, R. ECKE¹, S.E. SCHULZ^{1,4}, H. SCHMIDT^{1,5}, ¹Fraunhofer-Institut für Elektronische Nanosysteme, Dept. Back-End of Line, Chemnitz, Germany; ²Institut für Ionenstrahlphysik und Materialforschung, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany; ³Institut für Experimentelle Physik, TU Bergakademie Freiberg, Freiberg, Germany; ⁴Germany Zentrum für Mikrotechnologien (ZfM), Technische Universität Chemnitz, Chemnitz, Germany; ⁵Leibniz-Institut für Photonische Technologien e.V., (IPHT), Jena, Germany

FM-2:L14 Multi-level Resistive Switching in Core-Shell ZnO Nanowires Exhibiting Tunable Surface States

S. PORRO, F. RISPLENDI, G. MILANO, G. CICERO, C. RICCIARDI, Politecnico di Torino, Department of Applied Science and Technology, Torino, Italy

FM-2:IL15 Exploiting Nanoscale Effects in Phase Change Memories

M. SALINGA, RWTH Aachen University, Aachen, Germany

FM-2:IL16 Ovonic Threshold Switching Selector: From Material Engineering to Device Performance Improvement

G. NAVARRO, A. VERDY, V. SOUSA, M. BERNARD, G. BOURGEOIS, F. FILLOT, N. CASTELLANI, C. SABBIONE, P. NOE, J. GARRIONE, L. FELLOUH, G. MOLAS, M.C. CYRILLE, E. NOWAK, CEA-LETI, Grenoble, France

FM-2:IL17 Atomistic Simulations of Crystallization and Aging of GeTe Nanowires

S. GABARDI, E. BALDI, E. BOSONI, D. CAMPI, S. CARAVATI, **M. BERNASCONI**, Dipartimento di Scienza dei Materiali, Università di Milano-Bicocca, Milano, Italy; G.C. SOSSO, Department of Physics and Astronomy, University College London, UK; J. BEHLER, Institut fuer Physikalische Chemie, Theoretische Chemie, Universitaet Goettingen, Germany

FM-2:L18 Self-healing of a Confined Phase Change Memory Device with a Metallic Surfactant Layer

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FM-2:IL19 Van der Waals Gap Reconfiguration and Switching Mechanism in Ge-Sb-Te Superlattices

A.V. KOLOBOV, P. FONS, Y. SAITO, J. TOMINAGA, Nanoelectronics Research Institute, National Institute of Advanced Industrial Science & Technology, Tsukuba Central 5, Tsukuba, Ibaraki, Japan

FM-2:L20 Unipolar Resistive Switching in Pt/MgO/TaOx/Ta/Ru Thin Films

C. DIAS, L.M. GUERRA, B.D. BORDALO, J. VENTURA, IFIMUP-IN and Department of Physics and Astronomy, Faculty of Sciences, Porto, Portugal; HUA LV, S. CARDOSO, P.P. FREITAS, INESC-MN and IN - Institute of Nanoscience and Nanotechnology, Lisboa, Portugal; A.M. FERRARIA, A.M. BOTELHO DO REGO, Centro de Química-Física Molecular and IN, IST, Universidade de Lisboa, Lisboa, Portugal

FM-2:L21 Epitaxial Stabilization of Single Crystalline Semiconducting and Metallic NbO₂

J.E. BOSCHKER, S. BIN ANOOZ, T. MARKURT, M. ALBRECHT, J. SCHWARZKOPF, Leibniz Institute for Crystal Growth, Berlin, Germany; S. BIN ANOOZ, Physics Department, Faculty of Science, Hadramout University, Mukalla, Yemen; P. PETRIK, B. KALAS, Institute of Technical Physics and Materials Science, Budapest, Hungary; M. RAMSTEINER, Paul-Drude-Institut für Festkörperelektronik, Berlin, Germany

FM-2:L22 Magnetism as a Probe of the Origin of Memristive Switching in Oxide Semiconductors

X.L. WANG, **A. RUOTOLO**, Dept. of Materials Science and Engineering, City University of Hong Kong, Kowloon, Hong Kong SAR, China

FM-2:IL23 Random Telegraph Noise in Resistive Switching Memory Devices

F.M. PUGLISI, University of Modena and Reggio Emilia, Modena, Italy

FM-2:L24 Characterization of Low Frequency Noise in Oxygen Engineered Hafnium Oxide-based RRAM Devices

E. PIROS¹, M. LONSKY², S. PETZOLD¹, S.U. SHARATH¹, E. HILDEBRANDT¹, B. KRAH¹, J. MÜLLER², L. ALFF¹, ¹Technische Universität Darmstadt, Darmstadt, Germany; ²Goethe-Universität Frankfurt, Germany

FM-2:IL25 Anionic and Protonic Carriers for Oxide-based Neuromorphic Computing

J.L.M. RUPP, Electrochemical Materials, Massachusetts Institute of Technology, MIT, USA

Session FM-3

Emerging Applications for Non-volatile Memories

FM-3:IL01 Learning in Spiking Neural Networks using Phase Change Memory Synapses

B. RAJENDRAN, Department of Electrical and Computer Engineering, New Jersey Institute of Technology, Newark, NJ, USA

FM-3:IL02 Photonic Phase-change Computational Devices

ZENGGUANG CHENG¹, N. YOUNGBLOOD¹, C. RIOS¹, D. WRIGHT², W. PERNICE³, **H. BHASKARAN**¹, ¹Department of Materials, University of Oxford, Oxford, UK; ²Department of Engineering, University of Exeter, UK; ³University of Muenster, Germany

FM-3:IL03 RRAM Based New Computing Paradigms

JINFENG KANG, P. HUANG, R.Z. HAN, C. LIU, Y.N. JIANG, Z. ZHOU, Y.C. XIANG, L.F. LIU, X.Y. LIU, Peking University, Beijing, China

FM-3:IL04 Diffusive Memristor as a Building Block for a Novel True Random Number Generator

QIANGFEI XIA, HAO JIANG, University of Massachusetts Amherst, MA, USA

FM-3:IL05 Design and CMOS Co-integration of ReRAM Devices and Crossbar Arrays for Neuromorphic Applications

Y. LEBLEBICI, EPFL, Switzerland

FM-3:L06 Specific Switching Algorithms for Emerging Applications of RRAM based Memories

E. PEREZ, M.K. MAHADEVAIAH, **Ch. WENGER**, IHP, Frankfurt (Oder), Germany; C. ZAMBELLI, P. OLIVO, Università degli Studi di Ferrara, Ferrara, Italy; F.M. PUGLISI, P. PAVAN, Università di Modena e Reggio Emilia, Modena, Italy; M. ZIEGLER, H. KOHLSTEDT, Kiel University, Kiel, Germany

FM-3:L07 Evolution of a-IGZO Thin-film Transistor Memory: From Incapability of Electrical Erase to Achievement of Multi-level Cell

SHI-JIN DING, School of Microelectronics, Fudan University, Shanghai, China

FM-3:IL08 Spintronics Memories for Bio-inspired Computing

D. QUERLIOZ, A.F. VINCENT, A. MIZRAHI, D. VODENICAREVIC, T. HIRTZLIN, J.S. FRIEDMAN, N. LOCATELLI, J. GROLLIER, University Paris-Sud, Orsay, France

FM-3:IL09 Spintronic Analog Memory for Neuromorphic Computing

SHUNSUKE FUKAMI^{1,2,3,4}, W.A. BORDERS¹, A. KURENKOV¹, C. ZHANG^{1,2}, S. DUTTAGUPTA^{1,3}, H. OHNO^{1,2,3,4,5}, ¹Laboratory for Nanoelectronics and Spintronics, RIEC, Tohoku University, Japan; ²Center for Spintronics Integrated Systems, Tohoku University, Japan; ³Center for Innovative Integrated Electronic Systems, Tohoku University, Japan; ⁴Center for Spintronics Research Network, Tohoku University, Japan; ⁵WPI-Advanced Institute for Materials Research, Tohoku University, Japan

FM-3:L10 Understanding Organic Spintronic Devices and their Applications to Neuromorphic Computing

A. RIMINUCCI¹, ZHI-GANG YU², M. CALBUCCI¹, R. CECCHINI¹, P. GRAZIOSI¹, M. PREZIOSO³, I. BERGENTI¹, A. DEDIU¹, ¹Institute for the Study of Nanostructured Materials, CNR, Bologna, Italy; ²ISP/Applied Sciences Laboratory, Washington State University, Spokane, WA, USA; ³Department of Electrical and Computer Engineering, University of California at Santa Barbara, Santa Barbara, CA, USA

FM-3:L11 Prospects for Adoption of the FeFET Technology beyond Pure Memory Application

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FM-3:L12 Emerging Applications for Electroforming-free Perovskite Memristors

H. SCHMIDT^{1,2,3,5}, NAN DU^{1,4}, D. BÜRGER^{1,4}, I. SKORUPA³, R. ECKE⁴, S.E. SCHULZ⁴, ¹Materials systems for Nanoelectronics, Chemnitz University of Technology, Chemnitz, Germany; ²Faculty of Physics, Friedrich-Schiller University of Jena, Jena, Germany; ³Leibniz-Institut für Photonische Technologien e.V. (IPHT), Jena, Germany; ⁴Helmholtz-Zentrum Dresden-Rossendorf, Institute of Ion Beam Physics and Materials Research, Dresden, Germany; ⁵Fraunhofer-Institut für Elektronische Nanosysteme, Abteilung Back-End of Line, Chemnitz, Germany

FM-3:L13 Ferroelectric Capacitors as Circuit Components

J.T. EVANS Jr., Radiant Technologies, Inc., Albuquerque, NM, USA

FM-3:IL14 Memory Systems in Biology Modeled by Analog Electronics
R. DANIEL, Biomedical Engineering Department, Israel Institute of Technology (Technion), Israel

FM-3:IL15 Interfacing Organic Memristors with Neurons in a Bio-hybrid Network
S. IANNOTTA, S. BATTISTONI, V. EROKHIN, CNR-IMEM, Parma, Italy

FM-3:L16 A RRAM-based Self-organizing Neural Network
M. PEDRO, J. MARTIN-MARTINEZ, R. RODRIGUEZ, M. NAFRIA, Departament d'Enginyeria Electrònica, Universitat Autònoma de Barcelona (UAB), Cerdanyola del Valles, Barcelona, Spain

FM-3:IL17 Computational Memory: The First Step Towards Non-von Neumann Computing?
A. SEBASTIAN, IBM Research - Zurich, Rueschlikon, Switzerland

FM-3:IL18 Resistive Memories for Low Power Embedded Computing
E. VIANELLO, A. GROSSI, T. WERNER, E. NOWAK, CEA Leti, Grenoble, France

FM-3:IL19 Dynamics of HfO₂-based Resistive Memory for Neuromorphic Computation
S. BRIVIO, J. FRASCAROLI, E. COVI, S. SPIGA, Laboratorio MDM, IMM-CNR, Agrate Brianza, Italy

FN-1:IL09 Towards the Intrinsic Mobility Limit of CVD Grown Graphene
C. STAMPFER, JARA-FIT and 2nd Institute of Physics, RWTH Aachen University, Germany

FN-1:IL10 Controlled Growth of Boron Delta-doped Structures for High Performance Diamond Electronic Devices
J.E. BUTLER, Euclid Techlabs LLC, Solon, OH, USA

FN-1:IL11 Single-walled Carbon Nanotubes: From Synthesis to Applications
A.G. NASIBULIN, Skolkovo Institute of Science and Technology, Moscow, Russia

FN-1:IL12 Epitaxial Graphene on SiC - Status and Prospects
R. YAKIMOVA, I. SHTEPLIUK, M. VAGIN, I.G. IVANOV, T. IAKIMOV, G.R. YAZDI, J. ERIKSSON, Linköping University, IFM, Linköping, Sweden

FN-1:L13 Integrated Synthesis of Nitrogen and Sulfur Co-doped Carbon Spheres from Melamine and Biaminobenzenesulfonic Acid as Superior Catalyst for Selective Oxidation of Aromatic Alkanes
RONGWEN LYU, M.H. LIU, Dalian University of Technology, Dalian, Liaoning, China

FN-1:L14 Ultrathin Graphitic Films
R.B. DOS SANTOS^{1,2}, F. DE BRITO MOTA¹, R. RIVELINO¹, A. KAKANAKOVA-GEORGIEVA², **G.K. GUEORGUIEV²**, ¹Instituto de Física, Universidade Federal da Bahia, Salvador, Bahia, Brazil; ²Department of Physics, Chemistry and Biology (IFM), Linköping University, Linköping, Sweden

FN-1:L15 New Approaches for Preparation of Graphene-based Structures with the Intended Chemical Composition from Graphene Oxide
M.K. RABCHINSKII, A.T. DIDEIKIN, M.V. BAIDAKOVA, V.V. SHNITOV, D.A. KIRILENKO, S.V. KONIAKHIN, A. YA. VUL', Ioffe Institute, St.Petersburg, Russia; F. Roth, TU Bergakademie, Freiberg, Germany

FN - 6th International Conference NOVEL FUNCTIONAL CARBON NANOMATERIALS

Session FN-1 Growth and Processing

FN-1:IL01 Light Scattering and Emission from Hetero-structures
A.C. FERRARI, Cambridge Graphene Centre, University of Cambridge, Cambridge, UK

FN-1:IL02 Highly Efficient Solar-fuel Photocatalysts for CO₂ Reduction to Selective Hydrocarbons
KUEI-HSIEN CHEN^{1,2}, Indrajit Shown¹, Li-Chyong Chen², ¹Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan; ²Centre for Condensed Matter Sciences, National Taiwan University, Taipei, Taiwan

FN-1:IL03 Preparation and Applications of Hybrid Graphene Hydrogels
E. VAZQUEZ, Instituto Regional de Investigación Científica Aplicada (IRICA), Universidad de Castilla-La Mancha, Ciudad Real, Spain

FN-1:IL04 The Nano-carbon Landscape: From Doped Graphene and Molecular Sensors to Nanotubes and their Biological Applications
M. TERRONES, Dept. of Physics, Dept. of Chemistry, Dept. of Materials Science and Engineering and Center for 2-Dimensional & Layered Materials, The Pennsylvania State University, University Park, PA, USA; Institute of Carbon Science and Technology, Shinshu University, Japan

FN-1:IL05 Soft Processing (= Green Processing) for Nano Carbons: Direct Fabrication of Functionalized Graphenes and Their Hybrids Inks via Submerged Liquid Plasma [SLP] and Electrochemical Exfoliation [ECE] under Ambient Conditions
MASAHIRO YOSHIMURA, J. SENTHILNATHAN, K. SANJEEVARAO, E. SATHEESHKUMAR, Promotion Centre for Global Materials Research (PCGMR), Dept. of Materials Science and Engineering, National Cheng Kung University, Tainan, Taiwan

FN-1:IL06 Graphene Exfoliation and Processing
A. CIESIELSKI, Institut de Science et d'Ingenierie Supramoléculaires (ISIS), Université de Strasbourg and CNRS, Strasbourg, France

FN-1:IL07 Controlled Growth of High-quality Graphene and Various 2D Materials for Enhancing their Applications
HIROKI AGO, Global Innovation Center (GIC), Kyushu University, Fukuoka, Japan and National Institute for Advanced Science and Technology (AIST), Tsukuba, Japan

FN-1:IL08 Biomimetic On-surface Growth of Graphene Nanoribbons
HIROSHI SAKAGUCHI, Institute of Advanced Energy, Kyoto University, Kyoto, Japan

Session FN-2 Structural Characterization

FN-2:IL01 Advanced Nanoporous Carbon Based Materials: Challenges and Opportunities
A. VINU, Global Innovation Chair Professor and Director, Global Innovative Center for Advanced Nanomaterials, Faculty of Natural Built Environment and Engineering, The University of Newcastle, Callaghan, Newcastle, NSW, Australia

FN-2:IL02 Vibrational Spectroscopy Characterization of Nanographenes and Polynes
M. TOMMASINI, Dipartimento di Chimica, Materiali e Ingegneria Chimica, Politecnico di Milano, Milano, Italy

FN-2:IL03 Advanced Electron Microscopy Techniques applied to Carbon Nanomaterials and Composites
O. ERSEN, G. MELINTE, Institut de Physique et Chimie des Matériaux de Strasbourg (IPCMS), UMR 7504 CNRS - Université de Strasbourg, Strasbourg Cedex, France

FN-2:IL04 Small Angle Neutron Scattering for Characterization of Carbon Nanostructures
V.T. LEBEDEV, Saint-Petersburg Nuclear Physics Institute, National Research Center "Kurchatov Institute", Saint-Petersburg, Russia

FN-2:IL05 Interface and Properties of Nanocrystalline CVD diamond on AlGaIn/GaN Heterostructures
K. HAENEN, Hasselt University, Institute for Materials Research (IMO), Diepenbeek, Belgium; IMEC vzw, IMOMECE, Diepenbeek, Belgium

FN-2:IL06 Potential Environmental Impact of Carbon Nanomaterials
E. FLAHAUT¹, L. LAGIER², L. EVARISTE², A. MOTTIER², F. MOUCHET², P. LONCHAMBON¹, G. CHIMOWA¹, B. SOULA¹, A.-M. GALIBERT¹, E. PINELLI², L. GAUTHIER², ¹CIRIMAT, Interuniversity Engineering and Research Centre on Materials UMR CNRS-UPS-INPT N°5085, Toulouse, France; ²ECOLAB, University of Toulouse, CNRS, INPT, UPS, Castanet-Tolosan, France

FN-2:IL07 Measurement of Graphene/Metal Contact Resistance using Kelvin Probe Force Microscopy
W. MERTIN, G. BACHER, Universität Duisburg-Essen, Werkstoffe der Elektrotechnik und CENIDE, Duisburg, Germany; C. ALVARADO CHAVARIN, present address: Innovations for High Performance Microelectronics IHP GmbH, Frankfurt (Oder), Germany

FN-2:L08 Laser-induced Breakdown Spectroscopy: A Perspective Method for Nanocarbon Materials Characterization
V.F. LEBEDEV, N.V. NIKONOROV, ITMO University, Saint-Petersburg, Russia; M.K. RABCHINSKII, A.V. SHVIDCHENKO, A.Ya. VUL', Ioffe Institute, St. Petersburg, Russia

Session FN-3

Properties

FN-3:IL01 Nanotube Thin Films for Transparent, Flexible and Stretchable Electronics Applications

E.I. KAUPPINEN, Department of Applied Physics, Aalto University, School of Science, Aalto, Finland

FN-3:IL02 Electronic and Magnetic Structures of 3D Disordered Network of Nanographene Sheets under Heat Treatment at High Temperatures

TOSHIKI ENOKI, Department of Chemistry, Tokyo Institute of Technology, Tokyo, Japan

FN-3:IL03 Carbon Materials for Sodium-ion Batteries – and the Intriguing Case of Reversibly Intercalating Solvated Ions into Graphite

P. ADELHELM, Jena University, Jena, Germany

FN-3:IL04 Positive Zeta Potential of Nanodiamonds

L. GINES¹, S. MANDAL¹, ASHEK-I-AHMED², CHIA-LIANG CHENG², M. SOW³, C. MAGEN⁴, **O.A. WILLIAMS¹**, ¹School of Physics and Astronomy, Cardiff University, UK; ²Department of Physics, National Dong Hwa University, Hualien, Taiwan; ³EPSRC Centre for Doctoral Training in Diamond Science and Technology, Warwick University, UK; ⁴Laboratorio de Microscopias Avanzadas (LMA), Instituto de Nanociencia de Aragon (INA), Universidad de Zaragoza, Zaragoza, Spain

FN-3:IL05 Functionalization in Graphene and Related Hybrids for Applications in Hydrogen Evolution Reaction

LI-CHYONG CHEN, Center for Condensed Matter Sciences, National Taiwan University, Taipei, Taiwan Kuei-Hsien Chen Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan

FN-3:IL06 The Organic-2D Transition Metal Dichalcogenide Interface

ANDREW T.S. WEE, Department of Physics, National University of Singapore, Singapore

FN-3:IL07 Preparation of Porous Graphene/CoFe₂O₄ Composites and their Microwave Absorbing Properties

HAOLIANG XUE¹, QINGZE JIAO^{1,2}, CAIHONG FENG¹, QINWU¹, HANSHENG LI¹, DAXIN SHI¹, **YUN ZHAO¹**, ¹School of Chemistry and Chemical Engineering, Beijing Institute of Technology, Haidian District, Beijing, China; ²School of Materials and Environment, Beijing Institute of Technology, Tang Jia Wan, Zhuhai, Guangdong, China

FN-3:IL08 Oxide Ceramics Toughened by the Addition of Graphene flakes

M. BONIECKI, P. GOLEBIEWSKI, K. KASZYCA, W. WESOLOWSKI, M. WOLUNTARSKI, A. PIATKOWSKA, M. ROMANIEC, P. CIEPIELEWSKI, K. KRZYŻAK, Institute of Electronic Materials Technology, Warsaw, Poland

FN-3:IL09 Detonation Nanodiamonds. Particles, Hydrosols and Gels

A.Ya. VUL, E.D. EIDELMAN, A.E. ALEKSEENSKIY, A.V.SHVIDCHENKO, A.T.DIDEIKIN, V.S.YUFEREV, Ioffe Institute, St.Petersburg, Russia; V.T. LEBEDEV, YU.V. KUL'VELIS, B.P. KONSTANTINOV, Petersburg Nuclear Physics Institute, National Research Centre "Kurchatov Institute", Gatchina, Leninskaya Region, Russia; M.V. AVDEEV, Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Russia

Session FN-4

Applications

FN-4:IL01 BDD Multi-electrode e-tongue for Analytical Detection in Complex Media

B. ZRIBI, D. KAMOUNI BELGHITI, E. SCORSONE, **P. BERGONZO**, CEA-LIST, Diamond Sensors Laboratory, Gif-sur-Yvette, France

FN-4:IL02 Synthesis, Properties and Applications of Carbon Nanodots

M. PRATO, University of Trieste, Trieste, Italy

FN-4:IL03 Nanocarbons and Carbon Nanotubes -Safe Innovation and Promise for the Future-

MORINOBU ENDO, Shinsu University, Nagano, Japan

FN-4:IL04 Understanding the Kinetics of Heavy Metals on Epitaxial Graphene: Towards Monitoring the Water Quality

I. SHTEPLIUK, M. VAGIN, I. IVANOV, T. IAKIMOV, R. YAKIMOVA, Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden

FN-4:IL05 Carbon Nano-onions as Nanoprobe for Cancer Therapy

S. GIORDANI, Department of Chemistry, Università di Torino, Turin, Italy; and Nano Carbon Materials, Istituto Italiano di Tecnologia, Turin, Italy

FN-4:IL06 Side-gated Nanoscale Diamond Transistors

A.C. PAKPOUR-TABRIZI, **R.B. JACKMAN**, London Centre for Nanotechnology and the Department of Electronic and Electrical Engineering, University College London, London, UK

FN-4:IL07 Optimization of Gate Oxide for Reliable Diamond Power Transistors

E. GHEERAERT, Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France

FN-4:IL08 Graphene-based Micro-supercapacitors by Flash Lamp Technology

TAEYOUNG KIM, Department of Bionanotechnology, Gachon University, Seongnam, South Korea

FN-4:IL09 Carbon Nanofibers as Support for Pt-Catalysts in PEM Fuel Cells

P.Y. PODLESCHNY, U. ROST, M. BRODMANN, Westphalian University of Applied Sciences, Dortmund, Germany

FN-4:IL10 Beyond CMOS Solutions Enabled by Layered Materials

G. FIORI, Dipartimento Ingegneria dell'Informazione, University of Pisa, Pisa, Italy

FN-4:IL11 Graphene-based Materials for the Fast Adsorption of Biomolecules

M. SEREDYCH¹, F. MENG¹, L. MIKHALOVSKA², S. MIKHALOVSKY², V. MOCHALIN³, **Y. GOGOTSI¹**, ¹Department of Materials Science & Engineering and A.J. Drexel Nanomaterials Institute, Drexel University, Philadelphia, PA, USA; ²Department of Chemistry, Missouri University of Science & Technology, Rolla, MO, USA; ³School of Pharmacy and Biomolecular Sciences, University of Brighton, Lewes Road, Brighton, UK

FN-4:IL12 Applications of Detonation Nanodiamonds: Today and in Future

A.T. DIDEIKIN, Ioffe Institute, St. Petersburg, Russia

FN-4:IL13 Graphene-based Polymer Composites for Electromechanical Piezoresistive Sensors: General Aspects and Practical Considerations

TRAN THANH TUNG^{1,2}, J.F. FELLER³, D. LOSIC^{1,2}, ¹School of Chemical Engineering, The University of Adelaide, North Terrace, Adelaide, SA, Australia; ²ARC Research Hub for Graphene Enabled Industry Transformation, The University of Adelaide, North Terrace, Adelaide, SA, Australia; ³Smart Plastics Group, Bretagne Loire University (UBL), IRDL CNRS 3744-UBS, Lorient, France

FN-4:IL14 Black Diamond Technology for Solar Energy Conversion

A. BELLUCCI¹, M. GIROLAMI¹, M. MASTELLONE¹, S. ORLANDO¹, R. POLINI^{1,2}, **D.M. TRUCCHI¹**, ¹CNR-ISM, Rome, Italy; ²Dept. of Chemical Sciences and Technologies, Univ. di Roma "Tor Vergata", Roma, Italy

FN-4:IL15 Redox and Magnetically Active Nanoswitches Encapsulated in Hollow Carbon Nanotubes

M. DEL CARMEN GIMENEZ-LOPEZ, School of Chemistry, University of Nottingham, University Park, Nottingham, UK

FN-4:IL16 Elastocaloric Effect in Carbon Nanotubes and Graphene

S. LISENKOV, University of South Florida, Tampa, FL, USA

FN-4:IL17 Ammonia Sensing using Transfer-free in situ CCVD Grown Nanocrystalline Graphene

D. NOLL, U. SCHWALKE, Institute for Semiconductor Technology and Nanoelectronics, Technische Universität Darmstadt, Darmstadt, Germany

FN-4:IL18 Dye Adsorption by a Hybrid Composite for the Treatment of Wastewater in the Textile Industry

A.C. VAZ DE ARAÚJO, **R.K. NASCIMENTO**, UFRPE, Cabo de Santo Agostinho, Pernambuco, Brazil

FN-4:IL19 Aeronautical Composite Laminate Structure Containing Graphene Related Materials

C. MERINO, Grupo Antolin Ingeniería, Burgos, Spain; T. BLANCO, A. BUTRAGUEÑO, Airbus Operations, Getafe, Spain; A. REGUERO, Aernnova, Toledo, Spain; J. LÓPEZ PUENTE, University Carlos III Madrid, Leganés, Spain

FN-4:IL20 Graphene-based Neurointerfaces

M. BRAMINI, F. CESCA, F. BENFENATI, Center for Synaptic Neuroscience and Technologies & Graphene Labs, Istituto Italiano di Tecnologia, Genova, Italy

FN-4:IL21 Nanoscale Sensing using Color Centers in Diamond

M. RADTKE, R. NELZ, E. BERNARDI, A. MEYER, O. OPALUCH, M. CHALLIER, E. NEU, Saarland University, Saarbrücken, Germany

FN-4:IL22 Graphene Transistors in Biosensing Applications

S. ARPIAINEN, M. SOIKKELI, H. AROLA, T. NEVANEN, VTT Technical Research Centre of Finland Ltd, VTT, Finland

FO - 8th International Conference
**SCIENCE AND ENGINEERING OF
NOVEL SUPERCONDUCTORS**

Session FO-1

Materials, Structure, Physical Chemistry and General Properties

FO-1:IL01 Why is Tc in Cuprates so high?

I. BOZOVIC, Brookhaven National Laboratory, Upton, NY, USA; and Yale University, New Haven, CT, USA

FO-1:IL02 A Tale of Two Metals: Contrasting Criticalities in the Pnictides and Hole-doped Cuprates

N.E. HUSSEY, J. BUHOT, S. LICCIARDELLO, High Field Magnet Laboratory (HFML-EMFL), Radboud University, Nijmegen, Netherlands

FO-1:IL03 High Tc Pairing in Size-selected Metal Nanoclusters

V. KRESIN, P. EDWARDS, University of Southern California, Los Angeles, CA, USA; A. HALDER, Argonne National Laboratory, USA

FO-1:IL04 Superconductor / Ferromagnet Films and Superconducting Spintronics

M.G. BLAMIRE, Department of Materials Science, University of Cambridge, Cambridge, UK

FO-1:IL05 Phenomenological Interpretations of DFT Calculations for Superconductors

J.A. ALARCO, P.C. TALBOT, I.D.R. MACKINNON, Institute for Future Environments, and Science and Engineering Faculty, Queensland University of Technology, Brisbane, Queensland, Australia

FO-1:IL06 New Process for Growing the HgBa₂Ca₂Cu₃O_{8+δ} Superconductors with the Highest Critical Temperature at Ambient Pressure

B. LORET, A. FORGET, J.-B. MOUSSY, **D. COLSON**, SPEC, CEA, CNRS-UMR 3680, Université Paris-Saclay, Gif sur Yvette Cedex, France; S. POISSONNET, P. BONNAILLIE, SRMP, DMN, CEA, Université Paris-Saclay, Gif sur Yvette Cedex, France; G. COLLIN, LPS, C.N.R.S. UMR 8502, Université Paris-Sud, Orsay, France; P. THUÉRY, NIMBE, CEA, CNRS, Université Paris-Saclay, Gif sur Yvette Cedex, France; B. LORET, A. SACUTO, Laboratoire Matériaux et Phénomènes Quantiques, Paris Cedex, France

Session FO-2

New Superconductors of the Pnictides and Related Families

FO-2:IL01 Magnet Application of Iron-based Superconductors

AKIYASU YAMAMOTO, Department of Applied Physics, Tokyo University of Agriculture and Technology, Tokyo, Japan; J. WEISS, Department of Physics, University of Colorado, Boulder, CO, USA; M. AINSLIE, Department of Engineering, University of Cambridge, UK; A. POLYANSKII, D. LARBALESTIER, E. HELLSTROM, Applied Superconductivity Center, National High Magnetic Field Laboratory, Florida State University, USA

FO-2:IL02 Laser ARPES Study on High Temperature Superconductors

XINGJIANG ZHOU, National Lab for Superconductivity, Institute of Physics, Chinese Academy of Sciences, Beijing, China

FO-2:IL03 Novel Effects in Multilayer Superconductor/Magnet Films

C. BERNHARD, University of Fribourg, Department of Physics and Fribourg Center of Nanomaterials (FriMat), Fribourg, Switzerland

FO-2:IL04 Irradiation-induced Decoupling between Critical Temperature and Energy Gaps in P-doped Ba-122 Films

D. DAGHERO, M. TORTELLO, L. GOZZELINO, R.S. GONNELLI, Dipartimento di Scienza Applicata e Tecnologia, Politecnico di Torino, Torino, Italy; T. HATANO, T. KAWAGUCHI, H. IKUTA, Department of Crystalline Materials Science, Nagoya University, Nagoya, Japan

FO-2:IL05 Electronic and Magnetic Structures of H-doped 1111-type High Tc Superconductors

SOSHI IIMURA, HIDEO HOSONO, Tokyo Institute of Technology, Yokohama, Japan

Session FO-3

Properties of Superconductors

FO-3:IL01 Towards Atomic-scale Andreev Reflection

JOHN Y.T. WEI, University of Toronto & Canadian Institute for Advanced Research, Toronto, Canada

FO-3:IL02 What do we Really Understand in all Novel High-Tc Superconductors: Orbitals in Three Dimensions

D.K. SUNKO, Department of Physics, Faculty of Science, University of Zagreb, Zagreb, Croatia

FO-3:IL03 Collapse of High-Tc Superconductivity via Ultrafast Quenching of the Phase Coherence

F. BOSCHINI¹, E. RAZZOLI¹, E.H. DA SILVA NETO², M. ZONNO¹, G. LEVY¹, G.G. GU³, D.J. JONES¹, G. GIANNETTI⁴, A. DAMASCELLI¹, ¹Quantum Matter Institute, University of British Columbia, Vancouver, Canada; ²UC Davis, Davis, USA; ³Brookhaven National Laboratory, Upton, USA; ⁴Università Cattolica del Sacro Cuore, Brescia, Italy

FO-3:IL04 Analyzing Supercurrents with x-ray Eyes

J. ALBRECHT, Research Institute for Innovative Surfaces FINO, Aalen University, Germany; J. SIMMENDINGER, S. RUOSS, G. SCHÜTZ, MPI for Intelligent Systems, Stuttgart, Germany

FO-3:IL06 Comprehensive Phase Diagram of Two-dimensional Space Charge Doped Bi₂Sr₂CaCu₂O_{8+x}

E. STERPETTI¹, J. BISCARAS¹, A. ERB², A. SHUKLA¹, ¹Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie, Sorbonne Université Paris 06, UMR CNRS 7590, MNHN, IRD UMR 206, Paris, France; ²Walther Meissner Institut für Tieftemperaturforschung, Bayerische Akademie der Wissenschaften, Garching Germany

FO-3:IL07 Effects of Dy₂O₃ doping on the Anisotropy and Transport of MgB₂ Wires

M.D. SUMPTION, Department of Materials Science and Engineering, The Ohio State University, Columbus, OH, USA

FO-3:IL08 Properties and Structure of MgB₂-based Superconductors

T. PRIKHNA¹, V. ROMAKA², M. EISTERER³, A. KOZYREV¹, A. SHAPOVALOV¹, A. SHATERNIK¹, ¹V. Bakul Institute for Superhard Materials of the National Academy of Sciences of Ukraine (NASU), Kiev, Ukraine; ²Lviv Polytechnic National University, Lviv, Ukraine; ³Atominstut, TU Wien, Vienna, Austria

FO-3:IL09 A Possible Paradigm Shift in the Search for Higher Tc

PAUL C.W. CHU¹, L.Z. DENG¹, S.Y. HUYAN¹, K. ZHAO¹, B. LV², S. CHEN¹, Y. ZHU³, ¹Department of Physics and Texas Center for Superconductivity, University of Houston, Houston, TX, USA; ²University of Texas at Dallas, Richardson, TX, USA; ³Brookhaven National Laboratory, Upton, NY, USA

FO-3:IL10 Density Waves of HTSC in Atomic Scale

JINHO LEE, Dept. of Physics and Astronomy, Seoul National University, Republic of Korea CCES, Institute of Basic Science, South Korea

FO-3:IL11 A Fresh View of the Unusual Properties of the Cuprates

N. BARISIC, Institute of Solid State Physics, TU Wien, Wien, Austria; Department of Physics, Faculty of Science, University of Zagreb, Zagreb, Croatia

FO-3:IL12 Verwey-like Transition and its Correlation with Superconductivity in Fe₄Se₅

K.Y. YEH^{1,2,3}, T.S. LO¹, C.C. CHANG¹, M.J. WANG⁴, PHILLIP M. WU¹, G.S. CHANG-LIAO³, **MAW-KUEN WU**^{1,2}, ¹Institute of Physics, Academia Sinica, Taipei, Taiwan; ²Taiwan International Graduate Student Program, Academia Sinica, Taipei, Taiwan; ³Department of Engineering and System Science, National Tsing-Hua University, Hsinchu, Taiwan; ⁴Institute of Astronomy and Astrophysics, Academia Sinica, Taipei, Taiwan

Session FO-4

Theory and Mechanisms

FO-4:IL01 On Recent Progress in the Theory of high Tc Superconductivity

J. ZAAENEN, Institute Lorentz for Theoretical Physics Leiden University, Leiden, The Netherlands

FO-4:IL02 Superconductivity in Time Reversal Symmetry Breaking Compounds

HUIQIU YUAN, Center for Correlated Matter and Department of Physics, Zhejiang University, China

FO-4:IL03 Superconductivity in Topological Materials: Insights from Superconducting Density Functional Theory

RYOTARO ARITA, RIKEN Center for Emergent Matter Science, Saitama, Japan

FO-4:IL04 Macroscale Three-dimensional Proximity Effect and the Vortex States in Disordered Semiconductor/Superconductor Nanocomposites
KATSUYA UENO¹, NOBUHITO KOKUBO², SATORU OKAYASU³, TSUTOMU NOJIMA⁴, YUKIHITO NAGASHIMA⁵, YUSUKE SETO⁶, MEGUMI MATSUMOTO⁷, TAKAHIRO SAKURAI⁷, HITHOSHI OHTA⁸, KAZUYUKI TAKAHASHI¹, **TAKASHI UCHINO**¹, ¹Dept. of Chemistry, Graduate School of Science, Kobe University, Nada, Kobe, Japan; ²Dept. of Engineering Science, University of Electro-Communications, Chofu, Tokyo, Japan; ³Advanced Science Research Center, Japan Atomic Energy Agency, Tokai, Ibaraki, Japan; ⁴Institute for Materials Research, Tohoku University, Sendai, Japan; ⁵Nippon Sheet Glass Co., LTD., Konoike, Itami, Japan; ⁶Dept. of Planetology, Graduate School of Science, Kobe University, Nada, Kobe, Japan; ⁷Center for Support to Research and Education Activities, Kobe University, Nada, Kobe, Japan; ⁸Molecular Photoscience Research Center, Kobe University, Nada, Kobe, Japan

FO-4:IL05 BCS and BEC Mechanism of Superconductivity in Cuprates
Z. RADOVIC, University of Belgrade, Belgrade, Serbia

FO-4:IL06 Robust Dynamical Charge Density Waves in High-Tc Superconducting Cuprates
M. GRILLI, Dipartimento di Fisica, Università di Roma "Sapienza", Rome, Italy

FO-4:IL07 Fermi Surface Reconstruction in the Pseudogap State
J. STOREY, Robinson Research Institute, Victoria University of Wellington, Wellington, New Zealand

Session FO-5 Vortex Lattice Physics

FO-5:IL01 Anomalous Enhancement of Critical Current Density in Iron-based Superconductors with Splayed Columnar Defects
Anomalous Enhancement of Critical Current Density in Iron-based Superconductors with Splayed Columnar Defects

TSUYOSHI TAMEGAI, A. PARK, N. ITOH, N. YAMAOKA, S. PYON, Department of Applied Physics, The University of Tokyo, Tokyo, Japan; T. KAMBARA, A. YOSHIDA, Nishina Center, RIKEN, Wako, Saitama, Japan; S. OKAYASU, Advanced Science Research Center, Japan Atomic Energy Agency, Tokai, Ibaraki, Japan; A. ICHINOSE, Central Research Institute of Electric Power Industry, Electric Power Engineering Research Laboratory, Yokosuka, Kanagawa, Japan

FO-5:IL02 Point-like Defects for Enhanced Flux Pinning in Technical Nb3Sn Superconductors

J. BERNARDI, S. PFEIFFER, USTEM, Technische Universität Wien, Wien, Austria; T. BAUMGARTNER, M. EISTERER, Atominstytut, Technische Universität Wien, Wien, Austria; L. BOTTURA, C. SCHEUERLEIN, A. BALLARINO, CERN, Geneva, Switzerland

FO-5:IL03 Flux Pinning in Oxypnictide Thin Films

KAZUMASA IIDA^{1,2}, C. TARANTINI³, J. HÄNISCH⁴, F. KURTH⁵, J. JAROSZYNSKI⁶, T. OHMURA⁷, T. MATSUMOTO¹, T. URATA^{1,2}, T. HATANNO^{1,2}, S. MEYER⁴, S. KAUFFMANN-WEISS⁴, B. HOLZAPFEL⁴, D.C. LARBALESTIER⁸, H. IKUTA^{1,2}, ¹Department of Crystalline Materials Science, Graduate School of Engineering, Nagoya University, Japan; ²Department of Materials Physics, Graduate School of Engineering, Nagoya University, Japan; ³Applied Superconductivity Center, National High Magnetic Field Laboratory, Florida State University, USA; ⁴Institute for Technical Physics, Karlsruhe Institute of Technology, Germany; ⁵Institute for Metallic Materials, IFW Dresden, Germany

FO-5:IL04 Nature of the Second Magnetization Peak in Superconducting Single Crystals

L. MIU, National Institute of Materials Physics, Bucharest-Magurele, Romania

FO-5:IL05 STM Studies of Vortices in FeSe Single Crystals

M. IAVARONE, Department of Physics, Temple University, Philadelphia, PA, USA

Session FO-6 Synthesis and Processing

FO-6:IL01 Growth and Properties of Novel Superconducting Materials
G. LOGVENOV, Max Planck Institute for Solid State Research, Stuttgart, Germany

FO-6:IL02 MOCVD Growth of Twin-free Non-c-axis Oriented Thin Films of Bi2Sr2CaCu2O8 Superconductor Targeting Novel Electronic Device
KAZUHIRO ENDO, Kanazawa Inst. Technol., Hakusan, Ishikawa, Japan; S. ARISAWA, Natl. Inst. Mater. Sci., Tsukuba, Ibaraki, Japan; P. BADICA, Natl. Inst. Mater.Phys., Magurele, Romania

Session FO-7

Superconductor Applications

FO-7:IL01 High Temperature Superconductors for Rotating Machinery and Power Applications

J.L. TALLON, Robinson Research Institute, Victoria University of Wellington, Lower Hutt, New Zealand

FO-7:IL02 Superconducting Thin-film Quantum Circuits: Coherence Limits

A. USTINOV, Karlsruhe Institute of Technology, Karlsruhe, Germany

FO-7:IL03 On Progress in Superconducting Electronics

S. PAGANO^{1,2}, N. MARTUCCIELLO^{2,1}, ¹Physics Department, University of Salerno, Fisciano (SA), Italy; ²C.N.R. SPIN Salerno, Fisciano (SA), Italy

FO-7:IL04 Novel Josephson Junctions with Non-zero Ground State Phase

E. GOLDOBIN, R. MENDITTO, D. KOELLE, R. KLEINER, University of Tübingen, Tübingen, Germany

FP - 12th International Conference MEDICAL APPLICATIONS OF ADVANCED BIOMATERIALS AND NANO-BIOTECHNOLOGY

Session FP-1 Advances in Biomaterials

FP-1:IL01 Advanced Bioactive Structures for Intervertebral Disc Repair/Regeneration

L. AMBROSIO, A. GLORIA, Institute of Polymers, Composites and Biomaterials, National Research Council, Naples, Italy

FP-1:IL02 Shape Memory Activated Polyelectrolyte Nano-wrinkles Improve Fibroblast Cell Attachment and Alignment

P.T. MATHER, Chemical Engineering, Bucknell University, Lewisburg, PA, USA; A. ASH-SHAKOOR, J.H. HENDERSON, Biomedical and Chemical Engineering, Syracuse University, USA

FP-1:IL03 Development of a Fish Gelatin-based Soft Tissue Adhesive for Biomedical Applications

TETSUSHI TAGUCHI, RYO MIZUTA, Biomaterials Field, Research Center for Functional Materials, National Institute for Materials Science, Japan

FP-1:IL04 Additive Manufacturing of Biodegradable Composites for Application in Tissue Engineering

D.W. GRIJPMMA, University of Twente, Enschede, The Netherlands

FP-1:IL05 Cellular and Tissue Modulation via Exploiting Molecularly Movable Polyrotaxane Surfaces

NOBUHIKO YUI, J.-H. SEO, A. TAMURA, Y. ARISAKA, Tokyo Medical and Dental University, Tokyo, Japan; T. YAMAOKA, S. KAKINOKI, National Cerebral and Cardiovascular Center Research Institute, Osaka, Japan

FP-1:IL06 Development of Novel Antibacterial Nanoparticles Suitable for Coating on Intravascular Catheters

TSUTOMU FURUZONO, Department of Biomedical Engineering, Faculty of Biology-Oriented Science and Technology, Kindai University, Kinokawa, Japan

FP-1:IL07 Implementing Multifunctionality in Polymer-based Biomaterials

A. LENDLEIN^{1,2}, ¹Institute of Biomaterial Science and Berlin-Brandenburg Centre for Regenerative Therapies, Helmholtz-Zentrum Geesthacht, Teltow, Germany; ²University of Potsdam, Potsdam, Germany

FP-1:IL08 Design of Adhesive Growth Factors

YOSHIHIRO ITO, Nano Medical Engineering Laboratory, RIKEN, Japan Emergent Bioengineering Materials Research Team, RIKEN Center for Emergent Matter Science, Japan

FP-1:IL09 Next Generation Nanofiber Structures for Regenerative Engineering

N. NAGIAH, L.S. NAIR, **C. LAURENCIN**, The Institute for Regenerative Engineering, University of Connecticut Health Center, University of Connecticut, Farmington, CT, USA

FP-1:L10 Shape Memory Polypeptide

LIN GU, YUANZHANG ZHANG, JINLIAN HU, Institute of Textiles & Clothing, The Hong Kong Polytechnic University, Hong Kong

FP-1:L11 Photocrosslinkable Keratin Hydrogels for Cell Encapsulation

E. JABBARI, University of South Carolina, Columbia, SC, USA

FP-1:L12 Calcium Phosphate Surfaces and Bone Regeneration

M. BOHNER, RMS Foundation, Bettlach, Switzerland

FP-1:L13 Programmable Biomaterials for Mechanobiology

J.H. HENDERSON, Syracuse Biomaterials Institute, Syracuse University, Syracuse, NY, USA

FP-1:L14 Fabrication and Evaluation of Beta-tricalcium Phosphate Granules Cement

KUNIO ISHIKAWA, Dept. of Biomaterials, Faculty of Dental Science, Kyushu University, Fukuoka, Japan

FP-1:L15 New Medical Sorbents on the Basis of Porous Aluminosilicates, Silver Nanoparticles and Antimicrobial Peptides

O.Yu. GOLUBEVA, N.Yu. ULYANOVA, E.Yu. BRAZOVSKAYA, Institute of Silicate Chemistry, Russian Academy of Sciences, St. Petersburg, Russia

FP-1:L16 Synthesis and Characterization of Copper Oxide Based Polymeric Nano-systems for Biomedical Imaging

I.S. WEITZ¹, O. PERLMAN², S.S. SIVAN¹, H. AZHARI², ¹Department of Biotechnology Engineering, ORT Braude College, Karmiel, Israel; ²Department of Biomedical Engineering, Technion-Israel Institute of Technology, Technion City, Haifa, Israel

Session FP-2

Tissue Engineering and Regenerative Medicine

FP-2:IL01 Multifunctional Complex Tissue Engineering Scaffolds

MIN WANG, Department of Mechanical Engineering, The University of Hong Kong, Hong Kong

FP-2:IL02 Guided Bone/Tendon Regeneration by Growth Factor-Immobilized Asymmetrically Porous Membranes

JIN HO LEE, Hannam University, Daejeon, South Korea

FP-2:L03 Electrospun Extracellular Matrix: Harnessing the Advantages of ECM in a Tailor-made Tissue-specific Scaffold

S. ZAHARAN, L. BARUCH, **M. MACHLUF**, Faculty of Biotechnology and Food Engineering, Technion-Israel Institute of Technology, Haifa, Israel

FP-2:IL04 Cell Migration Mediated by Gradient Cues in Biomaterials

CHANGYOU GAO, Zhejiang University, Hangzhou, China

FP-2:IL05 Polymeric and Biomimetic Porous Scaffolds for Tissue Engineering

GUOPING CHEN, NAOKI KAWAZOE, Research Center for Functional Materials, National Institute for Materials Science, Ibaraki, Japan

FP-2:L06 Freeze Casting Technique to Process Ceramic-polymer Composites for Bone Tissue Regeneration

D. DON LOPEZ^{1,2,3}, A.P. TOMSIA², F. GUITIÁN RIVERA¹, ¹Instituto de Cerámica de Galicia, Universidade de Santiago de Compostela, Galicia, Spain; ²Lawrence Berkeley National Laboratory, California, USA; ³Tehran University of Medical Science, Tehran, Iran

FP-2:L07 Injectable Amnion Membrane Hydrogels for Musculoskeletal Regenerative Engineering

M. BHATTACHARJEE, J.L. ESCOBAR IVIRICO, H.M. KAN, L.S. NAIR, C.T. LAURENCIN, Institute for Regenerative Engineering, University of Connecticut Health Center, Farmington, CT, USA

FP-2:L08 Preparation, Characterization and In Vivo Performance of Decellularized Cornea

AKIO KISHIDA, Y. HASHIMOTO, J. NEGISHI, K. NAM, T. KIMURA, S. SASAKI, Tokyo Medical and Dental University, Tokyo, Japan; S. SASAKI, T. HONDA, S. HATTORI, H. KOBAYASHI, NIMS, Ibaraki, Japan

Session FP-3

New Therapeutics and Intelligent Drug/Biomolecule/
Gene Delivery Systems**FP-3:IL01 Rational Design of Polyrotaxanes as a Therapeutic Agent to Metabolic Diseases**

ATSUSHI TAMURA, NOBUHIKO YUI, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Tokyo, Japan

FP-3:IL02 Novel Multifunctional Drug and Gene Delivery Systems based on Supramolecular Self-assembled Macromolecules

JUN LI, Department of Biomedical Engineering, National University of Singapore, Singapore

FP-3:IL03 Intracellular Delivery of Nanocarriers and Targeting to Subcellular Organelles

V. TORCHILIN, Center for Pharmaceutical Biotechnology and Nanomedicine, Northeastern University, Boston, MA, USA

FP-3:IL04 "Borono-lectin" Engineering as a Versatile Platform for Intelligent Drug Delivery Systems

AKIRA MATSUMOTO, Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Tokyo, Japan

FP-3:IL05 Targeted and Controlled Delivery of an Anti-tumor Chelator to Brain Cancer Cells

S. MAJD, University of Houston, Houston, TX, USA

FP-3:L06 Peptide-based Nanomaterials for Delivery of Therapeutic Flavonoids

Y. HAMEDANI, K. ZHANG, P. MACHA, **M.C. VASUDEV**, University of Massachusetts Dartmouth, Dartmouth, MA, USA

Session FP-4

Nanomaterials Systems for Bio-imaging and
Theranostics**FP-4:IL01 Surface Modified Nanoparticles for Biomedical Imaging**

PEILIN CHEN, Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan

FP-4:IL02 In Vitro and in Vivo High-resolution Fluorescence Imaging in Centimeter-deep Tissue via Ultrasound Switchable Fluorescence

BAOHONG YUAN, University of Texas at Arlington, Arlington, TX, USA

FP-4:IL03 Tumour Environment Responsive Oolymeric Nanomedicine for Multimodality Theranostics

ZHENGWEI MAO, Department of Polymer Science and Engineering, Zhejiang University, Hangzhou, China

FP-4:IL04 Light-triggered Assembly of Gold Nanoparticles for Tumour Theranostics

XIAJU CHENG, **HAIBIN SHI**, Soochow University, Suzhou, Jiangsu, China

FP-4:IL05 Nanostructured Hybrid Materials for Biomedical Applications

L. DE STEFANO, M. TERRACCIANO, R. MORETTA, P. DARDANO, I. REA, Institute for Microelectronics and Microsystems, National Research Council, Naples, Italy and University of Naples Federico II, Naples, Italy

FP-4:L06 Chemical Synthesis and Theranostic Applications of Magnetic Nanoparticles

YANGLONG HOU, HONGCHEN ZHANG, SHIYAN TONG, College of Engineering, Peking University, Beijing, China

FP-4:L07 Rational Design of the Nano Bio Interface for Optimal Performance in Nanomedicine

I. YAROVSKY, P. CHARCHAR, N. TODOROVA, RMIT University, Melbourne Victoria, Australia

Session FP-5

Clinical Translations in Diagnosis and Therapy, and in
Implantable Prostheses and Micro-nano Devices**FP-5:IL01 Advanced Nanobiomaterials for Neural Interfaces**

M.R. ABIDIAN, Biomedical Engineering, University of Houston, Houston, TX, USA

FP-5:L03 Opto-magnetic Biosensing with Silicon Photonics

N. PESERICO¹, P. PRATIM SHARMA¹, A. BELLONI¹, F. DAMIN², M. CHIARI², A. MELLONI¹, R. BERTACCO¹, ¹Politecnico di Milano, Milano, Italy; ²ICRM-CNR, Milano, Italy

FP-5:IL04 Nano-ceramics and their Use in Biomaterials, Drug Delivery, Tissue Engineering, and as Novel Antibiotic Agents

P. GHANNADIAN, **T.J. WEBSTER**, Northeastern University, Department of Chemical Engineering, Boston, MA, USA

FP-5:IL05 Wireless Biopsy by Microgrippers

D. GRACIAS, Johns Hopkins University, Baltimore, MD, USA

FP-5:IL06 Direct Molecular Interrogation Facilitated by a Nanopore Technology

GUIGEN ZHANG, S. BEARDEN, University of Kentucky, Lexington, KY, USA

FP-5:IL07 Nanoplasmonic Quantification of Tumor-derived Extracellular Vesicles in Plasma Microsamples for Diagnosis and Treatment Monitoring

K. LIANG, F. LIU, J. FAN, D. SUN, C. LIU, D.W. BERNARD, M.H. KATZ, E. J. KOAY, Z. ZHAO, **TONY Y. HU**, The Biodesign Institute, Arizona State University, Tempe, AZ, USA

Poster Presentations

FA:P01 Facile Synthesis of Flexible In-plane Graphene Micro-supercapacitor Using Flash Reduction

SEOK HUN KANG, I.G. KIM, B.N. KIM, J.H. SUL, I.K. YOU, Electronics and Telecommunications Research Institute, Daejeon, South Korea

FA:P02 Lead-free Ceramic-polymer Composites for Flexible Piezoelectric Energy Harvesting

JAE-SHIN LEE, HYOUNG-SU HAN, SEONG-HYUN KIM, School of Materials Science and Engineering, University of Ulsan, South Korea

FA:P03 Efficient Heat Dissipation in III-Nitrides based HFETs Grown on Silver Substrate

H. HARDTDEGEN¹, **M. MIKULICS**², Z. SOFER³, ¹Ernst Ruska-Centre (ER-C-2) Forschungszentrum Juelich GmbH, Germany; ²Peter Grünberg Institute (PGI 9) and JARA - Fundamentals of Future Information Technology, Forschungszentrum Juelich GmbH, Germany; ³Dept. of Inorganic Chemistry, Institute of Chemical Technology, Prague, Prague, Czech Republic

FA:P04 Low-temperature Growth of Wafer-scale Layered MoS₂ by Chemical Vapor Deposition for Flexible Devices

SANG-WOO KANG, JIHUN MUN, CHEGAL WON, Korea Research Institute of Standards and Science (KRISS), Daejeon, South Korea

FA:P05 High Performance Flexible a-IGZO TFTs with Highly Hydroxylated Dielectric Surfaces

YAN SHAO, MEI-NA ZHANG, WEN-JUN LIU, SHI-JIN DING, School of Microelectronics, Fudan University, Shanghai, China

FB:P01 Band Alignment for an Hyperdoped Material Cu₂Se₂/Cug₂:Cr/Znse Heterostructure: A Theoretical View

P. PALACIOS^{1,2}, J.E. CASTELLANOS ÁGUILA^{1,3}, J. ARRIAGA³, J.C. CONESA⁴, P. WAHNON^{1,5}, ¹Instituto de Energía Solar, Universidad Politécnica de Madrid, Madrid, Spain; ²Dpt. FAIAN, Universidad Politécnica de Madrid, ETSI Aeronáutica y del Espacio, Madrid, Spain; ³Instituto de Física, Benemérita Universidad Autónoma de Puebla, Puebla, Mexico; ⁴Instituto de Catálisis y Petroleoquímica, CSIC, Cantoblanco, Madrid, Spain; ⁵Dpt. TFB, Universidad Politécnica de Madrid, ETSI Telecomunicación, Madrid, Spain

FB:P02 Impact of Grafted Side Chain Nature on Electrons and Hole Mobility in Anthracene Containing Co-polymer

F. TINTI, M. GAZZANO, N. CAMAIONI, Istituto per la Sintesi Organica e la Fotoreattività, Consiglio Nazionale delle Ricerche, Bologna, Italy; **F.K. SABIR**, Adama Science and Technology University, Adama, Ethiopia; T. YOHANNES, Department of Chemistry, Addis Ababa University, Addis Ababa, Ethiopia; S. RIGHI, Laboratorio di Micro e Submicro Tecnologie Abilitanti per l'Emilia Romagna (MIST E-R S.C.R.L.), Bologna, Italy; Ö. USLUER, C. ULBRICHT, D.A.M. EGBE, Linz Institute for Organic Solar Cells (LIOS), Johannes Kepler University Linz, Linz, Austria

FB:P03 Study of Bismuth Triiodide Nanoparticles Synthesis and their Application in Organic-inorganic Hybrid Bulk-heterojunction Solar Cells

L. BETHENCOURT, M.E. PÉREZ, H.Y. BENTOS PEREIRA, L.R. FORNARO, Grupo de Desarrollo de Materiales y Estudios Ambientales, Departamento de Desarrollo Tecnológico, Centro Universitario Regional del Este, Universidad de la República, Rocha, Rocha, Uruguay; I.M. AGUIAR, M. MOMBRÚ, Grupo de Desarrollo de Materiales y Estudios Ambientales, Área Radioquímica, Facultad de Química, Universidad de la República, Montevideo, Montevideo, Uruguay

FB:P04 Plasmonic Coupling Effects in Metal-based Composites for Photovoltaics

N. BEREZOVSKA, I. DMITRUK, O. YESHCENKO, V. KOZACHENKO, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine; M. DUSHEYKO, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, Ukraine

FB:P05 2D/3D Mixed Perovskite Solar Cells by Low-pressure Vapor-assisted Solution Process

HUNG-HSIANG YEH¹, YU-HSIEN CHIANG¹, MING-HSIEN LI¹, CHUN-JEN SU², U-SER JENG², **PETER CHEN**¹, ¹Department of Photonics, National Cheng Kung University, Tainan, Taiwan; ²National Synchrotron Radiation Research Center, Hsinchu City, Taiwan

FB:P06 Effective Methods for Improving Device Performance of Organic-inorganic Hybrid Perovskite Solar Cells

YANLIANG LIU¹, YONGCHAO MA¹, SUNG HEUM PARK¹, HO SUEB LEE², KIWAN JANG², **JUNG HYUN JEONG**¹, ¹Department of Physics, Pukyong National University, Busan, South Korea; ²Department of Physics, Changwon National University, Gyeongsangnam-do, South Korea

FB:P07 One-step Sputtering Process for High-efficiency Cu(In,Ga)Se₂ Thin Film Solar Cells

CHIA-HAO HSU, WEI-HAO HO, SHIH-YUAN WEI, CHUNG-HAO CAI, WEI-CHIH HUANG, **CHIH-HUANG LAI**, Department of Materials Science and Engineering, National Tsing Hua University, HsinChu, Taiwan

FC:P01 Beyond Photoelectrochemical Water Splitting

B. MEI, G. MUL, B. SEGER, PCS Group, MESA+ Institute for Nanotechnology, University of Twente, Enschede, Netherlands; Department of Physics, Technical University of Denmark, Kgs. Lyngby, Denmark

FC:P02 Intermediate Temperature Electro-reforming (ITER)

M.V. PAGLIARO^{1,2}, M. BELLINI¹, H.A. MILLER¹, W. OBERHAUSER¹, M.G. FOLLIERO^{1,2}, A. MARCHIONNI¹, J. FILIPPI¹, F. VIZZA¹, ¹ICCOM - CNR, Sesto Fiorentino (Firenze), Italy; ²Dipartimento di Chimica, Università degli Studi di Siena, Siena, Italy

FC:P03 Palladium Alloy Catalysts for CO₂ Electroreduction

M.G. FOLLIERO¹, H.A. MILLER¹, M. BELLINI¹, J. FILIPPI¹, M.V. PAGLIARO¹, A. MARCHIONNI¹, W. OBERHAUSER¹, F. VIZZA¹, C. EVANGELISTI², ¹ICCOM - CNR, Sesto Fiorentino, Italy; ²ISTM - CNR, Milano, Italy

FC:P04 Energy Efficient Production of Fuels and Formate by CO₂ Electroreduction on Copper Nanostructures

J. FILIPPI¹, M. BEVILACQUA¹, M. BELLINI¹, M. FOLLIERO^{1,2}, A. MARCHIONNI¹, H.A. MILLER¹, M. PAGLIARO^{1,2}, F. VIZZA¹, ¹ICCOM - CNR, Sesto Fiorentino, FI, Italy; ²Department of Biotechnology, Chemistry and Pharmacy, University of Siena, Siena, Italy

FC:P05 Hydrogen Barrier Coatings for Hydrogen Production and Storage

MOTONORI TAMURA, University of Electro-Communications, Chofu, Tokyo, Japan

FD:P01 Investigating the Effect of the Hydrophobic Block Structure on Durability of Ion Exchange Membranes for Electrochemical Applications

JANG YONG LEE, Korea Research Institute of Chemical Technology, Daejeon, South Korea

FD:P02 Durable Supercapacitor Based on Nanoscale Confinement of Manganese Oxide Nanoparticles in Hollow Carbon Nanostructures

C. HERREROS-LUCAS, A.N. KHLOBYSTOV, M.C. GIMENEZ-LOPEZ, School of Chemistry University of Nottingham, UK; M.W. FAY, Nanoscale and Microscale Research Centre, University of Nottingham, UK

FD:P03 Photoreduction and Enhanced Properties of Graphene Oxide Electrode for Supercapacitor

J.H. SUL, **IN GYOO KIM**, S.H. KANG, Y.S. YANG, I.K. YOU, Electronics and Telecommunications Research Institute, Daejeon, South Korea

FD:P04 MOF-based Electrode Materials for Electrochemical Energy Storage Devices

YOUNG HWAN KIM, HUN SEOK CHOI, SONG GUE CHOI, **KWANG-BUM KIM**, Department of Materials Science and Engineering, Yonsei University, Seodaemooon-gu, Seoul, South Korea

FD:P05 Hierarchical 3D Porous Nickel Sulfate/MXene Composite as Advanced Electrode for High-performance Supercapacitor with High Volumetric Energy Density

QIXUN XIA, Henan Polytechnic University, Jiaozuo city, China

FE:P01 Impact of Dopant Concentration on the Ionic Conductivity of Grain Boundaries in Ceria

T. BOLAND¹, P. REZ², P.A. CROZIER¹, ¹School for Engineering of Matter, Transport and Energy, Arizona State University, Tempe, AZ, USA; ²Department of Physics, Arizona State University, USA

FE:P02 La_{0.6}Sr_{0.4}Fe_{1-x}Pd_xO₃ (x=0.05, 0.10) as Electrocatalyst for SOFCs

A. MARCUCCI, F. ZURLO, S. LICOCCIA, Dept. of Chemical Science and Technologies, University of Rome "Tor Vergata", Rome, Italy; I. LUISETTO, Dept. of Mechanical and Industrial Engineering, University of Rome "Roma Tre", Rome, Italy; I. NATALI SORA, Dept. of Engineering and Applied Sciences, University of Bergamo, Dalmine, Italy; E. DI BARTOLOMEO, Dept. of Chemical Science and Technologies, University of Rome "Tor Vergata", Rome, Italy

FE:P03 Synthesis of Composites in the Y-doped ABO₃ Perovskite Type Structure - V₂O₅ Systems by Impregnation Method

A. LACZ, E. DROZDZ, AGH University of Science and Technology, Faculty of Materials Science and Ceramics, Krakow, Poland

FE:P04 Synthesis and Properties of Porous Ni/SrTiO₃/YSZ Composites

E. DROZDZ, A. LACZ, AGH University of Science and Technology, Faculty of Materials Science and Ceramics, Krakow, Poland

FE:P05 Nano-catalyst Socketed Electrodes for Solid Oxide Cells

JAE-HA MYUNG, Department of Materials Science and Engineering, Incheon National University, Incheon, South Korea

FE:P06 Sulfonated Block Copolyphenylchinoxalines as Proton Exchange Membranes

S. JANIEZ, H. KRÜGER, T. BRENING, Fraunhofer Institute Applied Polymer Research, Potsdam, Germany

FE:P07 Titanium Pyrophosphate- Alkali Carbonates Composites: Material Synthesis and Ionic Conductivity

L. MATHUR, S.K. GAUTAM, A.K. JAISWAL, B. SINGH, A.K. DUBEY, Department of Ceramic Engineering, Indian Institute of Technology (BHU), Varanasi, India

FE:P08 Carbon Monoxide Poisoning Effect on Fuel Cell Performance with Consideration of Cathode Liquid Flooding

KEN-MING YIN, W.-K. XIA, Y.-L. LAI, Chemical Engineering Department, Yuan Ze University, Taoyuan, Taiwan

FF:P01 Optimization in Basic Thermoelectric Properties of n-type Mg₂Si and Improvement in Elemental Durability Issues for Industrialization

TSUTOMU IIDA, T. KODAMA, M. TOKUMURA, H. HAMBATA, T. MANBA, R. HATANAKA, D. SHIOJIRI, K. NISHIO, A. YASUMORI, Y. KOGO, Department of Materials Science and Technology, Tokyo University of Science, Tokyo, Japan

FF:P02 Non-toxic and Low-cost Thermoelectric Materials: Al-Fe-Si Ternary Compounds

YOSHIKI TAKAGIWA, National Institute for Materials Science, Tsukuba, Ibaraki, Japan

FF:P03 Nanostructured Ag₂Te/PEDOT:PSS Hybrid Material for High Performance Thermoelectrics

M. RAJA THULASIMANI^{1,2,3}, K.A. MAZZIO^{1,2}, B. RYLL⁴, D. KOJDA⁴, K. HABICHT^{4,5}, S. RAOUX^{1,2,3}, ¹Institut für Nanospektroskopie, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ²Energy Materials In-Situ Laboratory, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ³Institut für Physik, Humboldt Universität zu Berlin, Berlin, Germany; ⁴Department Methods for Characterization of Transport Phenomena in Energy Materials, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ⁵Institut für Physik und Astronomie, Universität Potsdam, Potsdam, Germany

FF:P04 Metal-induced Crystallization of Si_{1-x}Gex for Thermoelectrics

K.A. MAZZIO^{1,2}, A. STEIGERT^{1,2}, M. FIEDLER^{1,2,3}, J. NIEDERHAUSEN^{1,2}, F. KRONAST⁴, M.A. MAWASS⁴, M. GORGOI^{1,2}, S. RAOUX^{1,2,5}, ¹Institut für Nanospektroskopie, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ²Energy Materials In-Situ Laboratory, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ³Beuth Hochschule für Technik Berlin, Berlin, Germany; ⁴Dept. Materials for Green Spintronics, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Berlin, Germany; ⁵Institute of Physics, Humboldt University Berlin, Germany

FF:P05 Life Prediction on Thermoelectric Module through Accelerated Life Test

HYOUNG-SEUK CHOI, Korea Institute of Ceramic Engineering and Technology, Jinju-si, South Korea

FF:P06 Roll to Roll Manufacturing of Flexible Thermoelectric Generators using Aerosol Jet Printing and Photonic Sintering

T.V. VARGHESE, Micron School of Material Science, Boise State University, Boise, ID, USA

FG:P01 Successful Reduction of HRE Contents as Practiced in Mass Production of Sintered TERRAMAG®1 NdFeB Permanent Magnets

N. KROPFF¹, K. RACHUT², J. D. ROSSA², **S. MÖWIUS**¹, M. VELICESCU¹, ¹BEC Gesellschaft für Produktmanagement mbH, Moers, Germany; ²Fraunhofer Project Group Materials Recycling and Resource Strategies IWKS Hanau, Germany

FG:P02 The Effect of Zn and Ni Substitution on Magnetic and Microwave Absorbing Properties of Co₂W Hexagonal Ferrites

HAN-SHIN CHO, **TIAN LIU**, **SUNG-SOO KIM**, Department of Advanced Materials Engineering, Chungbuk National University, Cheongju, South Korea

FG:P03 Influence of Pr Doping on Structure and Magnetocaloric Effect of La_{0.7}Sr_{0.3}MnO₃

P.D.H. YEN¹, A. GAMZATOV¹, A. ALIEV², T.D. THANH³, N.T. DUNG³, S.C. YU¹, ¹Department of Physics, Chungbuk University, Cheongju, South Korea; ²Amirkhanov Institute of Physics, DSC of RAS, Makhachkala, Russia; ³Institute of Materials Science, VAST, Hanoi, Vietnam

FG:P04 Stress-coupling Mechanism on Multicaloric FeRh-based Composite

V.V. RODIONOV¹, A.A. AMIROV^{1,3}, A.M. ALIEV³, I.A. STARKOV², ¹Center for Functionalized Magnetic Materials (FunMagMa) & Institute of Physics, Mathematics and Informational Technologies, Immanuel Kant Baltic Federal University, Kaliningrad, Russia; ²Nanotechnology Center, St. Petersburg Academic University, St. Petersburg, Russia; ³Amirkhanov Institute of Physics, Daghestan Scientific Center, Russian Academy of Sciences, Makhachkala, Russia

FG:P05 Magnetic and Transport Properties of Superelastic Fe_{43.5}Mn₃₄Al₁₅Ni_{7.5} Heusler Alloys

V. KHOVAYLO¹, M. SEREDINA¹, M. LYANGE¹, A. BOGACH², R. CHATTERJEE³, T. OMORI⁴, R. KAINUMA⁴, ¹National University of Science and Technology "MISIS", Moscow, Russia; ²Prokhorov General Physics Institute, Moscow, Russia; ³Indian Institute of Technology Delhi, New Delhi, India; ⁴Department of Materials Science, Graduate School of Engineering, Tohoku University, Sendai, Japan

FG:P06 FRIMAG Project: Development of a Prototype of Magnetocaloric Refrigerator

S. FABBRICI, MIST E-R srl, Bologna, Italy; **C. BENNATI**, **F. ALBERTINI**, IMEM-CNR, Parma, Italy; **M. SOLZI**, SMFI Department, University of Parma, Parma, Italy; **F. MELINO**, DIN - Alma Mater Studiorum University of Bologna, Bologna, Italy; **A. FARINA**, Industrial Engineering Department, University of Parma, Parma, Italy; **V. MUSSI**, MUSP Consortium, Piacenza, Italy; **M. ARDOINO**, Democenter-Sipe, Modena, Italy; **L. FERRARA**, SPIN Applicazioni Magnetiche srl, Piacenza, Italy; **E. FORLIN**, MBN Nanomaterialia S.p.A., Vascon di Carbonera (TV), Italy; **F. POLETTI**, Jonix Srl, Bologna, Italy

FG:P07 Comparative Study of the Order-disorder Transition in Different Iron based Alloys with Different Cr Addition

Z. BELAMRI¹, D. HAMANA², ¹Phase Transformations Laboratory, University Mentouri of Constantine, Constantine, Algeria; ²National Polytechnic School of Constantine, Nouvelle Ville Universitaire Ali Mendjeli, Constantine, Algeria

FG:P08 Magnetocaloric Effect in Multiferroic Spinel MnCr₂O₄

K. DEY, A. INDRA, S. GIRI, Department of Solid State Physics, Indian Association for the Cultivation of Science, Jadavpur, Kolkata, India

FG:P09 Low Temperature Magnetocaloric Effect in RVO₄ (R= Gd, Yb, Er)

A. INDRA, K. DEY, S. GIRI, Department of Solid State Physics, Indian Association for the Cultivation of Science, Jadavpur, Kolkata, India

FH:P01 Synthesis and Characterization of Regenerable Fe₃O₄@TiO₂- Noble Metal Photocatalyst Nanoparticles

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FH:P02 Optimization of Tungsten Anodization in the Presence of H₂O₂ to Obtain Nanostructured WO₃ Photoanodes

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FH:P03 Plastics and Photocatalysis: A Winner Combination for the Prevention of the Incoming of Plastic Wastes to the Environment

M.C. ARIZA-TARAZONA¹, **A. ALVAREZ-MÉNDEZ**¹, **J.J. RUIZ-VALDÉS**¹, **C. MUGONI**², **V. BARBIERI**², **C. SILIGARDI**², **E.I. CEDILLO-GONZÁLEZ**¹, ¹Universidad Autónoma de Nuevo León, Facultad de Ciencias Químicas, San Nicolás de los Garza, N.L., Mexico; ²Università degli Studi di Modena e Reggio Emilia, Dipartimento di Ingegneria "Enzo Ferrari", Modena, Italy

FH:P04 Maximization of Photocatalytic Activity of Bi₂S₃/TiO₂/Au Ternary Heterostructures by Proper Epitaxy Formation and Plasmonic Sensitization

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FI:P02 Photoluminescence of Fullerene C₆₀ Thin Film in Plasmon Coupled "Monolayer of Au Nanoparticles - C₆₀ Film - Al Film" Nanostructure

O. YESHCENKO, V.V. KOZACHENKO, N.I. BEREZOVSKA, Y.F. LIAKHOV, Physics Dept., Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

FI:P03 Emission Comparison of InAs Quantum Dots Embedded in Quantum Well with Different AlGaInAs Capping Layers

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FJ:P01 Microstructure and Electric Properties of Transparent Indium Oxide Thin Films Prepared by RF Magnetron Sputtering

TIAN LIU, **YONG-SOO JUN**, **MIN-SUNG KIM**, **SUNG-SOO KIM**, Department of Advanced Materials Engineering, Chungbuk National University, Cheongju, South Korea

FF:P02 Air-electrode Catalyst containing Conductive Vanadate Glass developed for Metal-air Rechargeable Battery

HAJIME MIYAMOTO, Y. FUJITA, S. MASUDA, T. NISHIDA, M. YUASA, N. OKA, Kindai University, Iizuka, Fukuoka, Japan

FF:P03 Mössbauer Study on the Substitution of Tin Oxide for Iron Oxide in Conductive Barium Iron Vanadate Glass

YUKI FUJITA¹, H. MIYAMOTO¹, T. IZUMI¹, S. MASUDA¹, S. KUBUKI², T. NISHIDA¹, N. OKA¹, ¹Kindai University, Iizuka, Fukuoka, Japan; ²Tokyo Metropolitan University, Hachi-Oji, Tokyo, Japan

FF:P04 Films of Transparent Conductive Oxides for Nitric Oxide Detection at Low Level

M.V. CHUPRIN, O.M. IVANOVA, **S.A. KRUTOVERTSEV**, L.S. KRUTOVERTSEVA, A.E. TARASOVA, CJSC "Ecological sensors and systems", Zelenograd, Moscow, Russia

FF:P05 Optical and Structural Analysis of ZnO:Al Nanocrystal Films Obtained by Ultrasound Spray Pyrolysis Method

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FK:P01 MAX Phases for Future Fission and Fusion Environments

M.T. RIGBY, D.J. BOWDEN, J.H. WARD, M. PREUSS, University of Manchester, Manchester, UK

FK:P02 Corrosion Behaviour and Microstructural Stability of Alumina-forming Austenitic Model Alloys Exposed to Oxygen-containing Molten Lead

HAO SHI, A. JIANU, A. WEISENBURGER, S. MIRAN, A. HEINZEL, R. FETZER, L. FABIAN, G. MUELLER, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, Germany

FK:P03 Structural State Features of the Base Metal after Recovery Annealing and Long-term Operation within VVER-440 RPV

E.A. KULESHOVA, A.S. FROLOV, D.A. MALTSEV, G.M. ZHUCHKOV, S.A. BUBYAKIN, D.Yu. ERAK, D.A. ZHURKO, S.V. FEDOTOVA, NRC KI, Moscow, Russia

FK:P04 Structural Features of Hydride Phase Formation in E110 Zr-alloy under the Influence of Various Factors

B.A. GUROVICH, E.A. KULESHOVA, A.S. FROLOV, D.A. MALTSEV, O.O. ZABUSOV, D.V. SAFONOV, E.V. KRIKUN, A.S. BRAGIN, NRC KI, Moscow, Russia

FL:P01 Structure Design and Property Study of Biomimetic Water Sensitive Shape-memory Polymer Materials

YUANZHANG JIANG, HU JINLIAN, Institute of Textiles and Clothing, the Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China

FM:P01 TEM of Transrotational Crystals in PZT Films with 10% La V.Yu. KOLOSOV¹, O.M. ZHIGALINA², D.N. KHMELNIN², A.O. BOKUNIAEVA¹, ¹Ural Federal University, Ekaterinburg, Russia; ²FSRC Crystallography & Photonics RAS, Moscow, Russia**FM:P02 Effect of Polarization Reversal on Current Transport across Thin Ferroelectric HfxZr1-xO2 Layer**

V. MIKHEEV, A. CHOUPRIK, A. CHERNIKOVA, D. NEGROV, A. ZENKEVICH Moscow Institute of Physics and Technology, Dolgoprudny, Moscow Region, Russia

FM:P03 Deep Level Transient Spectroscopy of Ferroelectric MIS Structures based on Hf0.5Zr0.5O2

E. KONDRATYUK, A. CHERNIKOVA, D. NEGROV, Moscow Institute of Physics and Technology, Dolgoprudny, Russia

FM:P04 Bottom Electrode Study of MIM-structures for RRAM Applications

B. KRAH, S. VOGEL, U. SHARATH, E. HILDEBRANDT, L. ALFF, Technische Universität Darmstadt, Institute of Material Science, Darmstadt, Germany

FM:P05 On the Resistive Switching Properties of Random Access Memory Based on Yttria-stabilized Zirconia

S.L. CHAO, **J.S. CHERNG**, Department of Materials Engineering, Ming Chi University of Technology, Taipei, Taiwan

FM:P06 Effect of Oxygen Vacancies in the ZnO Charge Storage Layer on the Performance of a-IGZO TFT Memory

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FM:P07 Self-assembly of Metal@Al2O3 Core-shell Nanoparticles and Nonvolatile Memory Properties

JONG-HWAN YOON, Department of Physics, Kangwon National University, Chuncheon, South Korea

FM:P08 The Energy-efficient Chip Implementation of a ReRAM-Based Binary Neural Network for Image Recognition

QIANG HUO, FENG ZHANG, Laboratory of Nano-Fabrication and Novel Devices Integrated Technology, Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China

FM:P09 Influence of Al-dopant Concentration in the ZnO-based Charge Trapping Layer on the Characteristics of a-IGZO TFT Memory

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FN:P01 Synthesis and Characterization of Stable and Ordered-packing High Order Acenes

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FN:P02 Functional Nanocomposites with Graphene-DNA Hybrid Complexes: Fabrication and Surface Properties under UV Irradiation

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FN:P03 Conductive Co3O4/Graphene (core/shell) Metal Oxide/Carbon Nanomaterials as Electrode Materials for Electrochemical Energy Storage Applications

JAEHO SHIM, Y. KO, K.S. LEE, C.-H. LEE, J.Y. HWANG, D.I. SON, Institute of Advanced Composite Materials, Korea Institute of Science and Technology (KIST), Jeonbuk, South Korea

FN:P04 Hierarchically Mesoporous Carbon Nanofiber/Copper Sulfide Composites as Anodes in Lithium Ion Batteries

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FN:P05 Micro Wires Graphene in Field Effect Transistors Defined by Photolithography Process

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FN:P06 A Microfabricated Sensor for Detecting Biochemical Markers of Bone Formation

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FO:P01 Superconducting Properties of a new Oxysulfate Superconductor

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FO:P02 Fabrication of Intrinsic Josephson Junction Devices using Hydrogen-atmosphere Treatment

HIROMI TANAKA, K. TANAKA, National Institute of Technology, Yonago College, Tottori, Japan; S. KISHIDA, Tottori University, Tottori, Japan

FO:P03 Design and Simulation of 4-bit Random Access Memory Composed of Reciprocal Magnetic Flux Quanta

S. NARENDRAN, J. SELVAKUMAR, SRM Institute of Science and Technology, Chennai, Tamil Nadu, India

FP:P01 Development of Gold Nanorod-based SERS tag for Food Safety Monitoring

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FP:P02 Characterization of the Algerian Phosphate with a View to its Valorisation as Biomaterial

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FP:P03 Structural, Morphological and Mechanical Properties of Laser Irradiated CaHPO4 Biomaterial

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FP:P04 Investigation of Optical Properties of Y-TZP for Aesthetic Dental Application: Effect of Oxygen Vacancies

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FP:P05 Synthesis of Nanometric TiO₂ and its Application as Bionanomaterial

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FP:P06 The Development of New Drug Delivery Systems based on Magnetic Zeolites

E. BRAZOVSKAYA, O.Y. GOLUBEVA, St. Petersburg, Russia

FP:P07 Isolation and Imaging of Circulating Tumor Cells

CHIUNG WEN KUO, PEILIN CHEN, Research Center for Applied Sciences, Academia Sinica, Taiwan

FP:P08 Programmable Multiple Capture/Release of Circulating Tumor Cells Using Conducting Polymers

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FP:P09 Support with Bactericide Coating for Curative Accomplishment and Hygiene on Inferior Memberst

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FP:P10 Nanobioactive Sol-gel Glass Reinforced-gelatin Based Composite Scaffolds for Bone Regeneration

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