

Ceramics for *Energy* CEn 2015

International Workshop

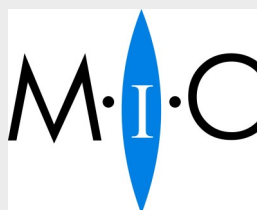
Final Program



14-15 May 2015

International Museum of Ceramics (MIC)

Viale Baccarini n. 19
48018 Faenza (RA) - Italy



COSTRUIAMO INSIEME IL FUTURO

TECNOPOLO RAVENNA

Oral presentations

Thursday, May 14, 2015

9:00 – 10:00 AM

Registration & Welcome Coffee

10:00 AM

Welcome and Introductory Remarks

A. Sanson, *ISTEC-CNR, Italy*
M. Peruzzini, *ICCOM-CNR, Italy*
A. Bellosi, *ISTEC-CNR, Italy*

Chair: A. Sanson, *ISTEC-CNR, Italy*

10:30 AM

Energy for a sustainable world

V. Balzani*, *University of Bologna, Italy*

11:00 AM

Development of solid oxide cells: materials, structures, architectures

R. Costa*, F. Han, M. Hörlein, G. Schiller, K.A. Friedrich, *German Aerospace Center - DLR, Germany*

11:20 AM

Chemically stable proton-conducting electrolytes for solid oxide electrolysis cells

E. Traversa*, *King Abdullah University of Science and Technology - KAUST, Saudi Arabia*

11:40 AM

Chemistry at the edge: perovskite exsolutions

J.T.S. Irvine*, D. Neagu, *University of St Andrews, UK*

12:00 AM

Recent developments in SOFC/SOEC materials and design at GJL

M. Viviani*, S. Presto, G. Canu, *IENI-CNR, Italy*; P. Piccardo, A. Barbucci, M.P. Carpanese, *University of Genova, IENI-CNR, Italy*

12:20 AM

Lanthanide nickelates: innovative oxygen electrode materials for solid oxide cells (SOFC/HTSE)

J.C. Grenier*, J.M. Bassat, F. Mauvy, A. Rougier, *ICMCB-CNRS, France*

12:40 AM

Glass-ceramic sealants and protective coatings for solid oxide cells: joining and integration issues

F. Smeacetto*, M. Salvo M., A.G. Sabato, *Politecnico of Torino, Italy*; M. Bindi, *Edison SpA, Italy*; M. Ferraris, *Politecnico of Torino, Italy*

1:00 – 2:00 PM

Lunch

Chair: E. Di Bartolomeo, *University of "Tor Vergata", Italy*

2:00 PM

Multi-scale modeling of solid oxide fuel cells

C. Nicoletta*, A. Bertei, *University of Pisa, Italy*

2:20 PM

Nanostructured zirconia for energy applications

J. Binner*, *University of Birmingham, UK*

2:40 PM

Electrochemical production of graphene/Fe₂O₃ composite foams as high-capacity electrodes

Z. Xia, E. Anitowska, *ISOF-CNR, Italy*; D. Wei, S. Borini, *Nokia R&D UK Ltd, UK*; V. Bellani, V. Morandi, *University of Pavia, Italy*; A. Zanelli, V. Palermo*, *ISOF-CNR, Italy*

3:00 PM

Characterization of electrosynthesized Rh structured catalysts by electron and X-Ray synchrotron microscopic techniques

P. Benito*, *University of Bologna, Italy*; W. De Nolf, *University of Antwerp, Belgium*; M. Monti, *University of Bologna, Italy*; G. Nuyts, *University of Antwerp, Belgium*; F. Basile, G. Fornasari, *University of Bologna, Italy*; K. Janssens, *University of Antwerp, Belgium*; A. Vaccari, *University of Bologna, Italy*

3:20 PM

Low-cost basalt and carbon reinforced ceramic composites

C. Mingazzini*, M. Scafè, *ENEA-Faenza Research Lab., Italy*; D. Caretti, D. Nanni, *University of Bologna, Italy*; E. Dolcini, D. Zagolin, *RI-BA Composites Srl, Italy*

4:00 – 4:30 PM

Coffee Break & Poster Session

Chair: S. Barison, *IENI-CNR, Italy*

4:30 PM

High efficiency CIGS-based thin film solar cells grown by Pulsed Electron Deposition (PED) technique

E. Gilioli*, F. Annoni, F. Bissoli, M. Bronzoni, M. Calicchio, E. Gombia, M. Mazzer, F. Pattini, S. Rampino, *IMEM-CNR, Italy*

4:50 PM

Materials in dye-sensitized solar cells

A. Sangiorgi*, *ISTEC-CNR and University of Parma, Italy*; R. Bondoni, N. Sangiorgi, *ISTEC-CNR and University of Roma "Tor Vergata", Italy*; A. Sanson, *ISTEC-CNR, Italy*

5:10 PM

Tetrahedrite, a possible sustainable thermoelectric material for middle temperatures

S. Battiston*, S. Fasolin, C. Fanciulli, A. Famengo, S. Fiameni, S. Boldrini, M. Fabrizio, *IENI-CNR, Italy*

5:30 PM

Selective absorbers and emitters for energy conversion

A. Licciulli*, S.K. Pal, *University of Lecce, Italy*; D. Diso, *Salentec Srl, Italy*

5:50 PM

Ultra-High Temperature Ceramics (UHTCs) as novel solar absorbers for CSP systems

D. Sciti*, L. Silvestroni, *ISTEC-CNR, Italy*; J.L. Sans, *INO-CNR, Italy*; L. Mercatelli, E. Sani, *PROMES-CNRS, France*

6:10 PM

Ceramic materials for clean and efficient energy generation from fossil fuels

F. Miccio*, V. Medri, E. Landi, *ISTEC-CNR, Italy*

Oral presentations

Friday, May 15, 2015

Chair: C. Galassi, ISTE-CNR, Italy

9:00 AM

Engineering ceramic ion-transport membranes for applications in energy and chemistry processes

J.M. Serra, J. Garcia-Fayos, S. Escolastico, R. Zanon, Instituto de Tecnología Química - UPV-CSIC, Spain*

9:30 AM

Assisted electrochemical synthesis for layer and multi-layer materials on conducting support

F. Basile, M. Monti, P. Benito, G. Fornasari, R. Mafessanti, A. Vaccari, University of Bologna, Italy*

9:50 AM

Ceramic multilayers for energy applications

E. Mercadelli, A. Gondolini, P. Pinasco, ISTE-CNR, Italy; D. Montaleone, ISTE-CNR and University of Parma, Italy; A. Sanson, ISTE-CNR, Italy*

10:10 AM

Recent advances in thermally sprayed thermal barrier coatings

O. Guillon, D. Mack, G. Mauer, E. Bakan, J. Bergholz, D. Koch, M. Mutter, S. Rezanka, N. Schlegel, Y. Zhang, R. Vaßen, Forschungszentrum Jülich GmbH, Germany*

10:30 – 11:00 AM

Coffee Break (kindly offered by AUREL AUTOMATION SpA) & Poster Session

Chair: L. Laghi, CertiMaC Scrl, Italy

11:00 AM

Influence of powder quality on processing and performance

A.B. Richter, A. Solheim, S.B. Labonnote-Weber, G. Syvertsen-Wiig, Ceramic Powder Technology AS, Norway*

11:20 AM

High performance electroceramic devices from SOLIDpower SpA

M. Bertoldi, SOLIDpower SpA, Italy*

11:40 AM

Solid particle erosion resistance and thermo-physical properties of the state-of-the art and advanced Thermal Barrier Coatings (TBCs) for gas turbines

F. Cernuschi, C. Guardamagna, S. Marchionna, L. Lorenzoni, RSE SpA, Italy; P. Bison, ITC-CNR, Italy; S. Boldrini, IENI-CNR, Italy; D. E. Mack, Forschungszentrum Jülich GmbH, Germany; A. Moscatelli, Flame Spray, Italy*

12:00 AM

Piezoelectric ceramic materials for energy harvesting and energy saving

G. Poli, Physik Instrumente (PI) Srl, Italy*

12:20 AM

DSSC cells, a jump into the future of photovoltaic building integration with advanced ceramic materials

S. Vierucci, L. Armiento, V. Borzatta, G. Gorni, C. Martelli, I. Zama, Daunia Solar Cell Srl, Italy*

12:40 AM

Stabilized large area DSC modules for BIPV

A. Lembo, Dyepower, Italy; C. Barolo, University of Torino, Italy; C. Bignozzi, University of Ferrara, Italy; T.M. Brown, University of Roma "Tor Vergata", Italy; L. Bonandini, E. Busatto, Dyepower, Italy; S. Caramori, University of Ferrara, Italy; A. Di Carlo, University of Roma "Tor Vergata", Italy; A. Guglielmotti, A. Guidobaldi, A. Lanuti, V. Liparoti, D. Magistri, P. Mariani, V. Mirruzzo, D. Prencipe, Dyepower, Italy; A. Reale, University of Roma "Tor Vergata", Italy; R. Riccitelli, A. Smarra, G. Soscia, R. Tagliaferro, L. Vesce, Dyepower, Italy; G. Viscardi, University of Torino, Italy*

1:00 PM

Ceramic materials for the building envelope: innovation and development for energy saving

J. Francisconi, L. Laghi, M. Morganti, CertiMaC Scrl, Italy*

1:30 – 2:30 PM

Lunch

Chair: M. Peruzzini, ICCOM-CNR, Italy

2:30 PM

Molecular solutions for energy: electricity and fuels from renewable sources

A. Abbotto, University of Milano-Bicocca, Italy*

2:50 PM

Production of hydrogen and chemicals from the electro-reforming of alcohols

H.A. Miller, F. Vizza, M. Bevilacqua, A. Lavacchi, M. Bellini, Y. Chen, L. Wang, ICCOM-CNR, Italy*

3:10 PM

Design of ceria based catalyst for energy and environmental applications

P. Fornasiero, ICCOM-CNR and INSTM, Italy*

3:30 PM

Brookite based photoelectrodes for photoelectrochemical water splitting

V. Dal Santo, A. Naldoni, F. Malara, ISTM-CNR, Italy; A. Beltram, T. Montini, ICCOM-CNR and University of Trieste, Italy; M.M. Mróz, T. Virgili, IFN-CNR – Politecnico of Milano, Italy; P. Fornasiero, ICCOM-CNR and University of Trieste, Italy*

3:50 PM

Water splitting reaction driven by structural and compositional heterogeneities of ceria-zirconia solid solutions

A. Pappacena, M. Boaro, University of Udine, Italy; J. Llorca, Universitat Politècnica de Catalunya – INTE, Spain; L. Armelao, University of Padova, IENI-CNR and INSTM, Italy; O. Solčova, Institute of Chemical Process Fundamentals of the ASCR, Czech Republic; A. Trovarelli, University of Udine, Italy*

4:10 – 4:20 PM

Final Remarks & Conclusion

Poster Session

P1

Infiltrated $\text{La}_{0.8}\text{Sr}_{0.2}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-d}$ based cells fed with biogas

F. Basoli*, E. Di Bartolomeo, University of Roma "Tor Vergata", Italy; I. Luisetto, University of Roma "Tre", Italy; F. Zurlo, C. Sarno, S. Licoccia, University of Roma "Tor Vergata", Italy

P2

Production of Dense GDC SOFC Electrolytes through Water Based Tape Casting

V. De Marco*, V.M. Sglavo, N. Zampini, University of Trento, Italy

P3

Influence of Lithium on the Sintering Behavior and on Electrical Properties of Gd-Doped Ceria

C. Ferone*, G. Accardo, R. Cioffi, University of Napoli "Parthenope", Italy; E. Di Bartolomeo, S. Licoccia, University of Roma "Tor Vergata", Italy

P4

Symmetrical SOFC with Cu-doped LSF perovskites

F. Zurlo*, A. D'Epifanio, University of Roma "Tor Vergata", Italy; I. Natali Sora, INSTM R.U. and University of Bergamo, Italy; V. Felice, S. Licoccia, E. Di Bartolomeo, University of Roma "Tor Vergata", Italy

P5

$\text{Sr}_{0.85}\text{Ce}_{0.15}\text{Fe}_{0.67}\text{Co}_{0.33}\text{O}_{3-d}$ IT-SOFC cathodes prepared by solution combustion synthesis: effect of the combustion fuel mixture

M.L. Tummino*, University of Torino and ISMN-CNR, Italy; F. Deganello, L.F. Liotta, ISMN-CNR, Italy; M. Lo Faro, S. Trocino, S. Campagna Zignani, A. Aricò, ITAE-CNR, Italy

P6

Influence of B-site doping and co-doping on the electrochemical properties of $\text{Sr}_{0.85}\text{Ce}_{0.15}\text{FeO}_{3-d}$ IT-SOFC cathodes

M.L. Tummino, University of Torino and ISMN-CNR, Italy; F. Deganello*, L.F. Liotta, ISMN-CNR, Italy; M. Lo Faro, S. Trocino, S. Campagna Zignani, A. Aricò, ITAE-CNR, Italy

P7

Effect of cathodic polarization on $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-d}$ and $\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-d}$ infiltrated electrodes for IT-SOFCs

M.P. Carpanese*, A. Giuliano, D. Clematis, M. Delucchi, M. Panizza, R. Botter, A. Barbucci, University of Genova, Italy

P8

Notable hydrogen permeation and CO_2 -stability of ceramic-ceramic composite membranes based on $\text{BaCe}_{0.65}\text{Zr}_{0.20}\text{Y}_{0.15}\text{O}_{3-d}$ and Y- or Gd-doped CeO_2

C. Mortalò*, E. Rebollo, IENI-CNR, Italy; S. Escolástico, Instituto de Tecnología Química - UPV-CSIC, Spain; S. Boldrini, S. Barison, IENI-CNR, Italy; S. Escorihuela, J. M. Serra, Instituto de Tecnología Química - UPV-CSIC, Spain; M. Fabrizio, IENI-CNR, Italy

P9

High temperature stability of $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-d}$ and $\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{1-y}\text{Fe}_y\text{O}_{3-d}$ oxygen separation perovskitic membranes

F. Cernuschi*, RSE SpA, Italy; M. Brisotto, University of Brescia, Italy; F. Drago, RSE SpA, Italy; C. Lenardi, P. Rosa, University of Milano, C. Meneghini, University of Roma "Tre", M. Merlini, University of Milano, Italy; C. Rinaldi, RSE SpA, Italy

P10

Membranes for hydrogen separation based on thin metallic film deposited by PVD on ceramic substrate

S. Fasolin*, M. Romano, S. Barison, M. Fabrizio, IENI-CNR, Italy

P11

Oxygen permeation properties and ion migration mechanism of layered perovskite $(\text{Sr}, \text{La})_3\text{Fe}_2\text{O}_7$

I. Kagomiya*, K. Jimbo, R. Kaneko, M. Nakayama, K. Kakimoto, Nagoya Institute of Technology, Japan; O. Masson, SPECTS-UMR -CNRS, France

P12

Spray-pyrolysis deposition and performance analysis of FTO films

E. Salernitano*, P. Fabbri, C. Mingazzini, F. Bezzi, ENEA-Faenza Research Lab., Italy, T. Dikonimos Makris, ENEA-Casaccia Research Center, Italy

P13

Influence of anions on transparency and electrochemical properties of electro-polymerized polypyrrole counter-electrode for dye-sensitized solar cells

N. Sangiorgi*, R. Bondoni, ISTEC-CNR and University of Roma "Tor Vergata", Italy; A. Sangiorgi, ISTEC-CNR and University of Parma, Italy; A. Sanson, ISTEC-CNR, Italy

P14

Role of water in TiO_2 screen-printing inks for dye-sensitized solar cells

R. Bondoni*, N. Sangiorgi, ISTEC-CNR and University of Roma "Tor Vergata", Italy; A. Sangiorgi, ISTEC-CNR and University of Parma, Italy; A. Sanson, ISTEC-CNR, Italy

P15

Ceramic tiles functionalised by photovoltaic cells

A. Salomoni*, S. Fazio, B. Mazzanti, Centro Ceramico, Italy; M. Bignozzi, Centro Ceramico and University of Bologna, Italy

P16

Hexagonal composite piezoelectric patch actuator for vibration control

D. Casagrande, P. Gardonio*, University of Udine, Italy

P17

Electrophoretic deposition of bilayer composite films based on $\text{CoFe}_2\text{O}_4/\text{TiO}_2$ and PZT

P. Galizia*, I.V. Ciuchi, D. Gardini, ISTEC-CNR, Italy; C. Baldisserri, TRE-Tozzi Renewable Energy, Italy; C. Galassi, ISTEC-CNR, Italy

Poster Session

P18

PLZT Based Antiferroelectric Plate Capacitors with High Energy Storage Density

I.V. Ciuchi*, ISTECCNR and "Alexandru I. Cuza" University, Romania; L. Mitoseriu, "Alexandru I. Cuza" University, Romania; Carmen Galassi, ISTECCNR, Italy

P19

Micro/Nano-power Energy Harvesting Circuits for Miniature Piezoelectric Transducers in the Internet of Things

A. Romani*, M. Dini, M. Filippi, M. Tartagni, University of Bologna, Italy

P20

Ceramics materials used for sensor technologies: an overview

E. Catalano*, University of Bari "Aldo Moro", Italy

P21

All-solution Synthesis of Large ZnO Nanorod networks for Sensing Applications

A. Resmini, I.G. Tredici, U. Anselmi-Tamburini, University of Pavia, Italy

P22

Geopolymer-based composite materials containing PCM for thermal energy storage

D. Frattini*, G. Roviello, C. Ferone, L. Ricciotti, R. Cioffi, University of Naples "Parthenope", Italy

P23

Geopolymers as solid adsorbent for CO₂ capture

M. Minelli*, University of Bologna, Italy; V. Medri, F. Miccio, E. Landi, ISTECCNR, Italy; F. Doghieri, University of Bologna, Italy

P24

Use of geopolymers as porous wicks in loop heat pipes

V. Medri*, E. Papa, A. Natali Murri, E. Landi, ISTECCNR, Italy; M. Minelli, F. Doghieri, University of Bologna, Italy; V. Latini, A. Urbani, S.A.B. Aerospace Srl, Italy

P25

Microwave chemical vapour infiltration of SiC-SiC composites for nuclear applications

J. Binner*, University of Birmingham, UK

P26

Self-healing Si₃N₄/SiC ceramic nanocomposites

L. Gruden, K. Krnel*, T. Kosmač, Jožef Stefan Institute, Slovenia

P27

Wet deposition processes for obtaining ceramic films with tailored thickness

A. Caldarelli*, CertiMaC Scrl, Italy; R. Bondoni, ISTECCNR and University of Roma "Tor Vergata", Italy; A. Gondolini, ISTECCNR, Italy; A. Sangiorgi, ISTECCNR and University of Parma, Italy; A. Sanson, ISTECCNR

P28

New advancements in insulative ceramics

F. Pavanello*, Automation Srl, Italy; R. André, Setaram Instrumentation, France; J. Nickerson, C-Therm Technologies, Canada

P29

Hard protective nitride coatings for extreme conditions by HiPIMS

S. M. Deambrosis, V. Zin*, E. Miorin, F. Montagner, S. Battiston, M. Fabrizio, IENICNR, Italy

P30

Hot salt corrosion of stainless steels for heat recovery in glass production

F. Bezzi*, A. Brentari, ENEA-Faenza Research Lab., Italy; C. Martini, A. Sangiorgi, University of Bologna, Italy

P31

Glass-ceramic joining materials for sodium-based battery

F. Smeacetto*, M. Salvo, Politecnico of Torino, Italy; M. Radaelli, M. Broglia, F. Cernuschi, RSE Spa, Italy; M. Ferraris, Politecnico of Torino, Italy

P32

Preliminary study on the possible applications of glass ceramic materials in the energy field

A. Lorenzi*, University of Parma, Italy; R. Carlini, G. Zanicchi, University of Genova, Italy; A. Montenero, University of Parma, Italy

P33

Transparent Yb:YAG ceramic laser gain media, on the way to clean energy

J. Hostaša, ISTECCNR and University of Chemical Technology, Italy and Czech Republic, A. Piancastelli, V. Biasini, L. Esposito*, ISTECCNR, Italy

P34

Microwave sintering of Na-β''Al₂O₃

R. Rosa, University of Modena and Reggio Emilia, Italy; S. Fasolin, C. Mortalò, IENICNR, Italy; P. Veronesi, C. Leonelli, University of Modena and Reggio Emilia, Italy; G. Dimitrakis, University of Nottingham, UK; M. Fabrizio, IENICNR, Italy