SYMPOSIUM ES9

Surfaces, Coatings and Interfaces in Concentrated Solar Energy Applications
April 19 - April 20, 2017

Symposium Organizers
Ibon Azkona, Metal Estalki
Jose Luis Endrino, Cranfield University
Ramon Escobar-Galindo, Abengoa Research
Matthias Krause, Helmholtz-Zentrum Dresden-Rossendorf

Symposium Support
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Proceedings Statement
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* Invited Paper

SESSION ES9.1: Boosting the Efficiency of Solar Collectors Using Nitride Films
Session Chairs: Andrea Ambrosini and Ramon Escobar-Galindo
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 226 C

8:00 AM WELCOME and INTRODUCTION

8:15 AM *ES9.1.01
High-Temperature Spectrally Selective Coatings for Solar Thermal Power Generation Applications Harish C. Barshilia; CSIR-National Aerospace Laboratories, India.

8:45 AM *ES9.1.02
On the Search of New Solar Absorbers for High Temperature Solar Selective Coatings—Molybdenum Short-Range Order in Mo–Si–N Systems Carlos Prieto; Instituto de Ciencia de Materiales de Madrid (CSIC), Spain.

9:15 AM ES9.1.03
Design of Solar Selective Coatings Based on Aluminium Titanium AlTi(O_xN_{1-x}) Oxynitrides for High-Temperature CSP Applications Irene Heras; Abengoa Research S.L., Spain.

9:30 AM ES9.1.04
Optical and Thermal Characterizations of an Ultrathin Metafilm Selective Solar Thermal Absorber with Excellent High Temperature Stability Hassan Alshehri; Arizona State University, United States.

9:45 AM BREAK

SESSION ES9.2: New Trends to Optimize Energy Conversion in Concentrated Photovoltaics
Session Chairs: Javier Barriga and Sungho Jin
Wednesday Morning, April 19, 2017
PCC North, 200 Level, Room 226 C

10:15 AM *ES9.2.01
Coupled Thermo-Mechanical and Photo-Chemical Degradation in Materials and Interfaces for Concentrated Solar Energy Applications Reinhold H. Dauskardt; Stanford University, United States.

10:45 AM ES9.2.02
A Tool to Characterize the Electrical Influence of the Thermal and Mechanical Behaviors of Materials of Optics for CPV Applications Ritou Arnaud; CEA INES, France.

11:00 AM ES9.2.03
Efficient Luminescent Solar Concentrators Based on Indirect Band Gap Silicon Quantum Dots Samantha Ehrenberg; University of Minnesota, United States.

11:15 AM ES9.2.04
Optical and Luminescence Properties of Ultranocrystalline Diamond (UNCD) Grown by Hot Filament Chemical Vapor Deposition Like a Principal Top Layer for "Photo-Enhanced Thermionic Emission Cells" Jorge A. Montes[1,2]; [1]Universidad de Sonora, Mexico; [2]University of Texas at Dallas, United States.

11:30 AM *ES9.2.05
Hybrid PV/CSP and Micro-Concentrated Solar PV Programs at ARPA-E Michael W. Haney; Advanced Research Projects Agency - Energy, United States.

SESSION ES9.3: Are Perovkistes the Future in PV Technology?
Session Chairs: Reinhold Dauskardt and Xavier Tonnellier
Wednesday Afternoon, April 19, 2017
PCC North, 200 Level, Room 226 C

1:30 PM ES9.3.01
Graphene Oxide/Perovskite Interfaces for Hybrid Lead Halide Perovskite/Graphene Solar Cells—An *In Situ* Spectroscopic Evaluation Muge Acik; Argonne National Laboratory, United States.

1:45 PM ES9.3.02
Flux Coating Growth of (10-1)-Oriented Epitaxial $NaTaO_3$ Crystals on $SrTiO_3$ Single Crystal Substrates Sayaka Suzuki; Shinshu University, Japan.

2:00 PM ES9.3.03
Synthesis and Characterization of Ammonium-Terminated Alkyl Monolayers on Si(111) Surfaces Alexander D. Carl; Worcester Polytechnic Institute, United States.

2:15 PM ES9.3.04
3D Si-SiO_2 Nano-Networks Formed by Diode Laser-Induced Liquid- and Solid-State Decomposition of SiO_x Erik Schumann; Helmholtz-Zentrum Dresden - Rossendorf, Germany.

2:30 PM BREAK

SESSION ES9.4: Advanced Tools for Modeling and *In Situ* Characterization of CSP Materials
Session Chairs: Matthias Krause and Andreas Schuler
Wednesday Afternoon, April 19, 2017
PCC North, 200 Level, Room 226 C

3:30 PM *ES9.4.01
Performances and Durability of Solar Absorber for CSP—Toward the Qualification Procedure Olivier Raccurt; Univ. Grenoble Alpes, France.

4:00 PM ES9.4.02
***In Situ* RBS, Raman and Ellipsometry Studies of Layered Material Systems at High Temperatures in a Cluster Tool** Daniel Janke; Helmholtz-Zentrum Dresden-Rossendorf, Germany.

4:15 PM ES9.4.03
Surface Chemistry for the Atomic Layer Deposition of Solar Selective Nanocomposite Coatings Anil Mane; Argonne National Laboratory, United States.

4:30 PM ES9.4.04
Refractory Solar Selective Nanocomposite Coatings for Concentrated Solar Power Receivers Jeffrey Elam; Argonne National Laboratory, United States.

4:45 PM ES9.4.05
The Role of Microstructure on Absorber Efficiency and Selectivity in Concentrating Solar Power—An FDTD Approach Angel Yanguas-Gil; Argonne National Laboratory, United States.

SESSION ES9.5: Scaling Up Challenges of Solar Collectors
Session Chairs: Olga Sanchez Garrido and Carlos Prieto
Thursday Morning, April 20, 2017
PCC North, 200 Level, Room 226 C

9:00 AM *ES9.5.01
Sol Gel Coating of Solar Receiver Tubes—Machine Design Criteria Christopher Sansom; Cranfield University, United Kingdom.

9:30 AM ES9.5.02
Development and Characterisation of Spectrally Selective Coatings to Work at 550C under Inert Gas Atmosphere Javier Barriga; IK4-TEKNIKER, Spain.

9:45 AM ES9.5.03
Spectrally-Selective Copper-Oxide Spinel Absorber Coatings for High-Temperature Concentrated Solar Power Systems Dale Karas; University of Nevada, Las Vegas, United States.

10:00 AM BREAK

SESSION ES9.6: Smart Concepts for Improving Perfomance of CSP Components
Session Chairs: Harish Barshilia and Olivier Raccurt
Thursday Morning, April 20, 2017
PCC North, 200 Level, Room 226 C

10:15 AM ES9.6.01
Nickel-Aluminium Based Anticorrosion Coatings Prepared by Plasma Spray for CSP Applications Sarah Yasir; Cranfield University, United Kingdom.

10:30 AM ES9.6.02
High Accuracy Infrared Directional Emission Spectroscopy between 100 and 1000 Degrees Celsius Telmo Echaniz; Basque Country University, Spain.

10:45 AM ES9.6.03
Degradation of Solar Mirrors in Accelerated Aging Test for Simulation of Costal Area Exposure Coralie Avenel; University of Grenoble Alpes, France.

11:00 AM ES9.6.04
Bismuth-Based Thin Films for Solar Concentrator Water Treatment—Relationship between Synthesis Conditions, Optical Properties and Photocatalytic Efficiency Valerie J. Leppert; University of California, United States.

11:15 AM ES9.6.05
Durability and Transmittance Assessments of Hydrophobic Coatings towards Increased Productivity of Solar Desalination Systems Xavier Tonnellier; Precision Engineering Institute, United Kingdom.

11:30 AM ES9.6.06
Solar-Selective and Temperature-Stable SnO_2-Based TCO for Solar Thermal Applications Frank Lungwitz; Helmholtz-Zentrum Dresden-Rossendorf, Germany.

11:45 AM ES9.6.07
Semiconductor-Dielectric Selective Absorbers for Solar Thermal Energy Conversion Nate Thomas; California Institute of Technology, United States.

SESSION ES9.7: Emerging Materials for Non-Conventional PV
Session Chairs: Samantha Ehrenberg and Matthias Krause
Thursday Afternoon, April 20, 2017
PCC North, 200 Level, Room 226 C

1:30 PM ES9.7.01
Monolithic Glass-Based Antireflective and Superhydrophobic Coatings—Broadband/Omnidirectional Light Harvesting and Self-Cleaning Characteristics Tolga Aytug; Oak Ridge National Laboratory, United States.

1:45 PM ES9.7.02
Efficiency Enhancement of ZnO Based Inverted BHJ Solar Cells via Interface Engineering Using Organic Interfacial Modifiers Sujit Kumar; IIT Kharagpur, India.

2:00 PM ES9.7.03
Comparative Study of Annealed and High Temperature Grown ITO and AZO Films for Solar Energy Applications Diego Alonso Alvarez; Imperial College London, United Kingdom.

2:15 PM ES9.7.04
High Device-Specific Haacke Figure of Merit in Transparent Composite Electrodes as a Promising Replacement of ITO in Organic Solar Cell Applications Terry Alford; Arizona State University, United States.

2:30 PM ES9.7.05
Effect of Ambient Microwave Annealing on Electrical and Optical Properties of Indium Tin Oxide Sharvanti Pinglay; Arizona State University, United States.

2:45 PM BREAK

SESSION ES9.8: Revisiting Oxide Surfaces for Competive CSP Plants
Session Chairs: Jose Luis Endrino and Ramon Escobar-Galindo
Thursday Afternoon, April 20, 2017
PCC North, 200 Level, Room 226 C

3:15 PM *ES9.8.01
Thermal Sprayed Oxide Coatings for Concentrating Solar Power Receivers Andrea Ambrosini; Sandia National Laboratory, United States.

3:45 PM *ES9.8.02
Nano Black-Oxide Coating as a High Efficiency Solar Absorber for Concentrating Solar Power Sungho Jin[2, 1]; [1]University of California, San Diego, United States; [2]Solar Reserve, LLC, United States.

4:15 PM *ES9.8.03
Selective Solar Absorber Coatings on Receiver Tubes for CSP—From Vacuum-Deposited Carbon Based Coatings to Wet-Chemical Derived Mixed Oxide Coatings Andreas M. Schuler; EPFL, Switzerland.

4:45 PM CLOSING STATEMENT

SESSION ES9.9: Poster Session
Session Chairs: Jose Luis Endrino and Erik Schumann
Thursday Afternoon, April 20, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

ES9.9.01
Solution-Processed Copper Nanoparticles for Selective Solar Absorption Derek Wang; Stanford University, United States.

ES9.9.02
Nickel Electrodeposition on Anodized Aluminum Oxide Films as Selective Absorbing Coating Made by AC Voltage with Variable Frequency Esther Santiago Cruz; Universidad Tecnológica de Huejotzingo, Mexico.

ES9.9.03
Effect of Pyramids Size Obtained by KOH Texturing on Silicon Solar Cell Performance Rameshwari Ghimire[1, 3]; [1]Arizona State University, United States; [3]Arizona State University, United States.

ES9.9.04
Polarization Resolved Grazing Angle Scatterometry for *In Situ* Monitoring of Roughness for Silicon and Compound Solar Cells, Light Emitting Devices and other Structured Surfaces Wojciech Walecki; Frontier Semiconductor, United States.

ES9.9.05
Large-Area of High Uniform CdS Thin Film Grown by Special Technique Chemical Bath Deposition Sheng Wen Chan; Industrial Technology Research Institute, Taiwan.

ES9.9.06
Fabrication of Zn(S, O) Buffer Layer for CIGS Solar Cells by Highly Deposited Rate Chemical Bath Deposition Process Sheng Wen Chan; Industrial Technology Research Institute, Taiwan.

ES9.9.07
$ZnO_{1-x}Te_x$ Thin Films Deposited by Reactive Magnetron Co-Sputtering—Compositional, Structural and Optical Properties Olga Sanchez Garrido; Instituto de Ciencia de Materiales de Madrid (CSIC), Spain.

ES9.9.08
Stress-Induced Surface Characterization by Wavelet and Fractal Analysis in Ga-Doped ZnO Thin Films Chenlei Jing; University of Electronic Science and Technology of China, China.