Program

6th International Conference on
Electrophoretic Deposition:
Fundamentals and Applications

October 1 - 6, 2017
Gyeongju, South Korea

Conference Chair

Prof. Aldo R. Boccaccini
Department of Materials Science and Engineering
University of Erlangen-Nuremberg, Germany

Conference Co-Chairs

Prof. Omer Van der Biest
Department of Metallurgy and Materials Engineering
Katholieke Universiteit Leuven, Belgium

Prof. James Dickerson
Center of Functional Nanomaterials
Brookhaven National Laboratory, USA

Dr. Tetsuo Uchikoshi
National Institute for Materials Science, Japan

Engineering Conference International
32 Broadway, Suite 314 - New York, NY 10004, USA
Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030
www.engconfintl.org – info@engconfintl.org
Hotel Hyudai Gyeongju
338, Bomun-ro, Gyeongju-si, Gyeongsangbuk-do
Korea
Telephone: +82-54-748-2233
http://www.hyundaihotel.com
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Previous conferences in this series

International Conference on Electrophoretic Deposition: Fundamentals and Applications
August 18-22, 2002
Banff, Alberta, Canada
Conference Chairs:
Aldo R. Boccaccini, Imperial College of Science, London, UK
P.S. Nicholson, McMaster University, Canada
Omer Van der Biest, Katholieke Universiteit Leuven, Belgium

2nd International Conference on Electrophoretic Deposition: Fundamentals and Applications
May 29-June 2, 2005
Barga, Italy
Conference Chairs:
Aldo R. Boccaccini, Imperial College of Science, London, UK
Omer Van der Biest, Katholieke Universiteit Leuven, Belgium
Rolf Clasen, University of Saarland, Saarbrucken, Germany

3rd International Conference on Electrophoretic Deposition: Fundamentals and Applications
October 5-9, 2008
Awaji Island, Japan
Conference Chairs:
Aldo R. Boccaccini, Imperial College of Science, London, UK
Omer Van der Biest, Katholieke Universiteit Leuven, Belgium
Rolf Clasen, University of Saarland, Saarbrucken, Germany
T. Uchikoshi, National Institute of Materials Science, Tsukuba, Japan

4th International Conference on Electrophoretic Deposition: Fundamentals and Applications
Oct. 2-7, 2011
Puerto Vallarta, Mexico
Conference Chairs:
Aldo R. Boccaccini, Imperial College of Science, London, UK
Omer Van der Biest, Katholieke Universiteit Leuven, Belgium
Rolf Clasen, University of Saarland, Saarbrucken, Germany
James Dickerson, Vanderbilt University, USA

5th International Conference on Electrophoretic Deposition: Fundamentals and Applications
October 5-10, 2014
Hernstein, Austria
Conference Chairs:
Aldo R. Boccaccini, Imperial College of Science, London, UK
Omer Van der Biest, Katholieke Universiteit Leuven, Belgium
T. Uchikoshi, National Institute of Materials Science, Tsukuba, Japan
James Dickerson, Vanderbilt University, USA
Sunday, October 1, 2017

17:00 – 18:00  Conference Check-in (Diamond Lobby)
18:00 – 18:30  Welcome Reception (Diamond Lobby)
18:30 – 20:00  Dinner (Sara Restaurant/Coffee shop – Lobby Level)

Notes

- Technical sessions will be in the Diamond Hall.
- Poster Sessions will be in the Crystal Hall.
- Breakasts and lunches will be in the Topaz Restaurant (breakfast hours from 7 am to 10 am).
- Dinners on Monday, Tuesday and Wednesday will be in the Topaz Restaurant.
- Audio, still photo and video recording by any device (e.g., cameras, cell phones, laptops, PDAs, watches) is strictly prohibited during the technical sessions, unless prior permission has been granted by the author and ECI.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
- Please do not smoke at any conference functions.
- Turn your mobile telephones to vibrate or off during technical sessions.
- Please write your name on your program so that it can be returned to you if lost or misplaced.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.

About Gyeongju

Gyeongju is Korea’s ancient cultural city, the capital of the once great Silla Kingdom (BC 57~AD 935). It is located approximately 350 km southeast of Seoul. When the Silla Kingdom reached the peak of its development, Gyeongju was estimated to have one million residents – four times its current size. UNESCO designated it both as one of ten World Heritage sites in Korea and as one of the world’s ten most important ancient cultural cities, both for its position in the historical and cultural development of East Asia and for its role in the formation of the Korean nation. Because of the vast number of archeological sites and cultural properties that remain in this city, Gyeongju is often referred to as ‘the museum without walls’. It is the main destination in South Korea for visitors interested in the cultural heritage of Silla and the architecture of the Joseon Dynasty.
Monday, October 2, 2017

07:30 – 08:30  Breakfast buffet

08:30 – 08:45  Conference Introduction by Conference Chair and Co-Chairs, ECI Liaison

**SESSION I: FUNDAMENTALS OF EPD PROCESS AND MODELLING**

**Session chair:** Aldo R. Boccaccini

08:45 – 09:15  **Keynote**
MODELING APPROACHES IN ELECTROPHORETIC DEPOSITION
Brian Giera, Lawrence Livermore National Laboratory, USA

09:15 – 09:45  INSIGHT INTO NANOPARTICLE CHARGING MECHANISM IN NONPOLAR SOLVENTS TO CONTROL THE FORMATION OF PT NANOPARTICLE MONOLAYERS BY ELECTROPHORETIC DEPOSITION
Ondřej Černohorský, Institute of Photonics and Electronics, AS CR, Czech Republic

09:45 – 10:15  DYNAMIC MESOSCALE MODEL OF REVERSIBLE ELECTROPHORETIC DEPOSITION
Brian Giera, Lawrence Livermore National Laboratory, USA

10:15 – 11.00  Coffee Break

**SESSION II: COATINGS**

**Session chair:** Stephan Barcikowski

11:00 – 11:20  STRUCTURAL COLOR COATING FILMS COMPOSED OF AN AMORPHOUS ARRAY OF SILICA AND CARBON BLACK PARTICLES BY ELECTROPHORETIC DEPOSITION, Kiyofumi Katagiri, Hiroshima University, Japan

11:20 – 11:40  INVESTIGATION OF MULTI-STAGE DEPOSITION TECHNIQUES OF INDUSTRIAL EPD PAINT FOR HIGH FILM THICKNESS AND MULTI-LAYER APPLICATIONS.
Peter Hope, LVH Coatings Ltd, United Kingdom

11:40 – 12:00  SYNTHESIS AND CHARACTERIZATION OF NANOCOMPOSITES COATING BASED ON INORGANIC OCTAHEDRAL CLUSTER UNITS FABRICATED BY ELECTROPHORETIC DEPOSITION PROCESS.
Fabien Grasset, CNRS, France

12:00 – 14:00  Lunch

14:00 – 17:30  Ad hoc sessions and/or free time

17:30 – 18:00  Afternoon Coffee

18.00 – 19.30  **SESSION III: POSTER SESSION I and Social Hour**

19:50 – 21:00  Dinner
Tuesday, October 3, 2017

07:30 – 08:30  Breakfast buffet

SESSION IV: NOVEL EXPERIMENTAL TECHNIQUES
Session chair:  Jay Dickerson

08:30 – 09:00  
Keynote
STRUCTURING OF ELECTRODE SURFACES WITH LIGAND-FREE NANO PARTICLES VIA ELECTROPHORETIC DEPOSITION- FUNDAMENTALS AND IN VIVO APPLICATIONS
Stephan Barcikowski, University of Duisburg-Essen, Germany

09:00 – 09:20  
FABRICATION OF POROUS, CRYSTALLINE-ORIENTED TITANIA LAYER ON TRANSPARENT ELECTRODE BY MAGNETIC FIELD-ASSISTED EPD
Tetsuo Uchikoshi
National Institute for Materials Science, Japan

09:20 – 09:40  
ELECTROPHORETIC DEPOSITION OF B,C/AL CERMETS IN A 3D GEOMETRY WITH GREATER CURVATURE FOR APPLICATIONS IN ARMOR SYSTEMS.
Andrew Pascall, Lawrence Livermore National Laboratory, USA

09:40 – 10:00  
EFFECT OF ELECTROOSMOTIC FLOW ON THE ELECTROPHORETIC DEPOSITION OF ZEOLITE POWDER ON A POROUS ALUMINA SUPPORT
Hideyuki Negishi, National Institute of Advanced Industrial Science and Technology (AIST), Japan

10:00 – 10:20  
FABRICATION AND CHARACTERIZATION OF TITANIA-NANOSHEET FILM BY ELECTROPHORETIC DEPOSITION TECHNIQUE
Jun-ichi Hamagami, Kanto Gakuin University, Japan

10:20 – 10:40  
UNDERSTANDING THE ORIGINS OF ELECTRICALLY TUNABLE STRUCTURAL COLOR IN AMORPHOUS COLLOIDAL CRYSTAL DEPOSITS
Scott Bukosky, University of California, Davis, USA

10:40 – 11:00  Coffee Break

SESSION V: CERAMICS AND FUNCTIONAL MATERIALS
Session chair:  Paula M. Vilarinho

11:00 – 11:30  
Keynote
APPLICATION OF ELECTROPHORETIC DEPOSITION FOR SOLID OXIDE FUEL CELL
Motohide Matsuda, Kumamoto University, Japan

11:30 – 11:50  
ELECTROPHORETIC DEPOSITION OF NANOPARTICLES FOR PHOTO- THERMAL SOLAR RECEPTORS
Guillaume Toquer. ICSM, France

11:50 – 12:10  
FORMATION OF CARBON INTERPHASE ON POLYCRYSTALLINE AND AMORPHOUS SiC FIBERS IN SiC/SiC COMPOSITES BY ELECTROPHORETIC DEPOSITION
Katsumi Yoshida, Tokyo Tech, Japan

12:10 – 12:30  
ENVIRONMENTALLY FRIENDLY PROCESSING OF LEAD FREE SODIUM POTASSIUM NI O BATE THICK FILMS BY ELECTROPHORETIC DEPOSITION
Paula Vilarinho, University of Aveiro, Portugal

12:30 – 12:50  Discussion: Functional materials by EPD: progress and challenges
Tuesday, October 3, 2017 (continued)

13:00 – 14:30  Lunch

14:30 – 16:00  Ad hoc sessions and/or free time

16:00 – 16:30  Afternoon Coffee

16:30 – 19:30  SESSION VI: OMER VAN DER BIEST SYMPOSIUM
Session Chair: Aldo R. Boccaccini and Tetsuo Uchikoshi

16:30 – 16:50  TAILORED MICROSTRUCTURE OF CERAMICS BY USING ELECTRIC AND MAGNETIC FIELDS
Tohru S. Suzuki, National Institute for Materials Science - Japan

16:50 – 17.10  ELECTROPHORETIC DEPOSITION AS A METHOD FOR THE PREPARATION OF CERAMIC FUEL CELLS
Christos Argirusis, National Technical University of Athens, Greece

17:10 - 17:30  THICK FILMS OF ELECTROCERAMICS BY ELECTROPHORETIC DEPOSITION: ON THE WAY TO DEVICES
Paula Vilarinho, University of Aveiro, Portugal

17:30- 17:50  MICROPOROUS ORGANIC-INORGANIC NANOCOMPOSITE COATING ON STAINLESS STEEL VIA EPD FOR BIOMEDICAL APPLICATIONS
Aldo R. Boccaccini, University of Erlangen-Nuremberg, Germany

17:50 – 18:10  NOVEL NANOSTRUCTURES GROWN BY ELECTROPHORETIC DEPOSITION USING SI SUBSTRATES WITH LOW RESISTIVITY
Mónica Tirado, Universidad Nacional de Tucumán, Argentina

18:10 – 18:30  EFFECT OF SURFACE MODIFIERS ON THE NANOFACTICLES ELECTRO-DRIVEN ASSEMBLY
Begoña Ferrari, Instituto de Cerámica y Vidrio, CSIC, Spain

18:30 – 18:50  AN OLD PROBLEM REVISITED: THE ELECTRIC CURRENT DURING CONSTANT VOLTAGE ELECTROPHORETIC DEPOSITION
Luc Vandeperre, Imperial College London. United Kingdom

18:50 – 19:10  FUNDAMENTAL ASPECTS OF SOLVENT-SOLUTE INTERACTIONS IN ELECTRODEPOSITION AND ELECTROPHORETIC DEPOSITION
Gregorio Vargas, CINVESTAV Unidad Saltillo, Mexico

19:10 – 19:30  RESEARCH ON ELECTROPHORETIC DEPOSITION IN HINDSIGHT AND FORESIGHT
Omer Van der Biest, K U Leuven, Belgium

19:50 – 21:00  Dinner

21:00 – 22:00  Social Hour (Sara Restaurant/Coffee shop – Lobby Level)
Wednesday, October 4, 2017

07:30 – 08:30  Breakfast buffet

SESSION VII: EPD OF BIOMATERIALS
Session Chair: Gregorio Vargas

08:30 – 08:50  DEVELOPMENT OF A BIODEGRADABLE NATURAL POLYMER/CERAMIC COATING FOR MG ALLOYS USING ELECTROPHORETIC DEPOSITION
Svenja Heise, Institute of Biomaterials, University of Erlangen-Nuremberg, Germany

08:50 – 09:10  BIO-TRIBOLOGICAL PROPERTIES AND MICROSTRUCTURE OF SEMICRYSTALLINE AL2O3/PEEK COATINGS ELECTROPHORETICALLY DEPOSITED ON THE Ti-13NB-13ZR ALLOY
Tomasz Moskalewicz, AGH University of Science and Technology, Poland

09:10 – 09:30  ELECTROPHORETIC DEPOSITION OF ZEIN/BIOGLASS COMPOSITES WITH INCORPORATION OF ESSENTIAL OILS
Laura Ramos Rivera, Institute of Biomaterials, University of Erlangen-Nuremberg, Germany

09:30 – 09:50  EPD OF DOPED NANOSTRUCTURED VITREOUS SILICA COATINGS: PROCESSING, ANTIMICROBIAL BIOACTIVITY AND APPLICATIONS
Guido Falk, Saarland University, Germany

09:50 – 10:10  ELECTROPHORETIC DEPOSITION OF HYDROXYAPATITE NANOPARTICLES FROM DIFFERENT ALCOHOLIC SUSPENSIONS: EFFECT OF TRIETHANOLAMINE
Morteza Farrokhi-Rad, Azarbaijan Shahid Madani University, Iran

10:10 – 10:30  ELECTROPHORETIC DEPOSITION OF LAWSONE LOADED NANO BIOACTIVE GLASS/CHITOSAN COMPOSITE ON PEEK/BG LAYERS
Muhammad Atiq Ur Rehman, University of Erlangen-Nuremberg, Germany

10:30 – 11:00  Coffee Break

11:00 – 12:30  SESSION VIII:
Young Persons Poster/Presentation Contest (JECS TRUST SPONSORED)
Session Chair: Begoña Ferrari

Influence of substrate morphology on ZnO nanostructures grown by electrophoretic deposition
Omar Alejandro Espindola, Universidad Nacional de Tucumán, Argentina

In-situ USAXS/SAXS Investigation of Tunable Structural Color in Amorphous Photonic Crystals during Electrophoretic Deposition
Scott Bukosky, University of California, Davis, USA

In vitro characterization of a biodegradable chitosan/bioactive glass coating for Mg alloys
Svenja Heise, University Erlangen-Nuremberg, Germany

Antibacterial and bioactive coatings based on electrophoretic deposition of chitosan/bioactive glass/lawsone on PEEK/bioactive glass layers
Muhammad Atiq Ur Rehman, University of Erlangen-Nuremberg, Germany

Effect of surface modifiers on the nanoparticles electro-driven assembly
Joaquin Luis Yus Domínguez, Institute of Ceramic and Glass, CSIC, Spain
Wednesday, October 4, 2017 (continued)

Anisotropic a-Fe2O3/Chitosan nanocomposites by electrophoretic deposition
Laura Ramos Rivera, University of Erlangen-Nuremberg, Germany

Fabrication of Octahedral Tantalum Cluster Film by Electrophoretic Deposition
Nguyen Thi Kim Ngan, Hokkaido University, Japan

12:30 – 14:00 Lunch
14:00 – 18:30 Optional excursion
19:50 – 21:00 Dinner
21:00 – 22:00 Social Hour (Sara Restaurant/Coffee shop – Lobby Level)
Thursday, October 5, 2017

07:30 – 08:30  Breakfast buffet

**SESSION XIX: NOVEL APPLICATIONS I**

**Session chair:** Omer van der Biest

08:30 – 09:00  **Keynote**

EPD FOR COMPOSITE CATHODE LAYER IN ALL-SOLID-STATE LITHIUM ION BATTERY BASED ON SULFIDE ELECTROLYTE

Atsunori Matsuda, Toyohashi University of Technology, Japan

09:00 – 09:20  ELECTRODEPOSITION OF BLACK OXIDE COATINGS ON ALUMINUM 6061 IN DEEP EUTECTIC SOLVENTS, FOR SOLAR THERMAL COLLECTION APPLICATIONS

Gregorio Vargas, Cinvestav-Saltillo, Mexico

09:20 – 09:40  REDUCED GRAPHENE OXIDE HYDROGELS, DEPOSITED IN NICKEL FOAM BY ELECTROPHORETIC DEPOSITION, FOR SUPERCAPACITOR APPLICATIONS: TOWARD HIGH VOLUMETRIC CAPACITANCE

James Dickerson, Brookhaven National Laboratory, United States of America

09:40 – 10:00  ELECTROPHORETIC DEPOSITION OF SNO₂ NANOSTRUCTURED THICK FILMS FOR CO SENSING

Paula Vilarinho, University of Aveiro, Portugal

10:00 – 10:20  Discussion: EPD in novel applications: progress and challenges

10:20 – 11:00  Coffee break

**SESSION XIII: NOVEL APPLICATIONS II**

**Session Chair:** Atsunori Matsuda

11:00 – 11:30  **Keynote**

NANOTUBE/FIBER MULTI-SCALE HYBRID COMPOSITES USING ELECTROPHORETIC DEPOSITION: PROCESSING, CHARACTERIZATION, AND SMART SENSING APPLICATIONS

Erik T. Thostenson, University of Delaware, USA

11:30- 11:50  FABRICATION OF SiC/SiC–ZrB2 COMPOSITES BY A HYBRID PROCESS OF ALTERNATING CURRENT ELECTROPHORETIC DEPOSITION (AC-EPD) AND HOT PRESSING

Kati Raju, Energy Materials Research Division, Korea Institute of Energy Research, South Korea

11:50 – 12:20  **Keynote**

COLLOIDAL ADDITIVE MANUFACTURING USING PROJECTION BASED LIGHT DIRECTED ELECTROPHORETIC DEPOSITION

Andrew Pascall, Lawrence Livermore National Laboratory, USA

12:20 – 14:00  Lunch

14:00 – 17:30  Ad hoc sessions and/or free time

17:30 – 19:00  **SESSION XV: POSTER SESSION II and Social Hour**

19:30 – 21:30  **Conference Banquet** (Emerald and Ruby Hall)
Friday, October 6, 2017

07:30 – 08:30  Breakfast buffet

**SESSION XVI: EPD INTEGRATING MANUFACTURING TECHNOLOGY**

*Session chair:* Guido Falk

08:30 – 08:50  ELECTROPHORETIC DISPLAYS WITH TUNABLE, ANGLE-INDEPENDENT COLOR
Elaine Lee, Lawrence Livermore National Laboratory, USA

08:50 – 09:10  ELECTROPHORETIC DEPOSITION OF METAL-PHTHALOCYANINE AS A HIGH-PERFORMANCE ELECTROCATALYST
Youichi Shimizu, Kyushu Institute of Technology, Japan

09:10 – 10:00  Discussion: EPD in Industrial Applications: Challenges

10:00 – 10:30  Coffee break

10:30 – 11:30  **Conclusions** (NEXT EPD CONFERENCE, INDUSTRIAL INVOLVEMENT, SCIENTIFIC NETWORK ON EPD, EUROPEAN PROJECTS, INCREASE PARTICIPATION OF “ELECTROCHEMISTRY COMMUNITY”, EDUCATIONAL MATTERS, ETC.)

12:00  Lunch and departures
Poster Presentations

1. Electrophoretic deposition of carbon nanotubes on carbon fibers
   Christos Argeris, National Technical University of Athens, Greece

2. Electrophoretic deposition of Ag nanoparticles into TiO2 nanotube arrays and their performance as photoanode of dye-sensitized solar cells
   Go Kawamura, Toyohashi University of Technology, Japan

3. Fabrication of octahedral tantalum cluster film by electrophoretic deposition
   Ngan T.K Nguyen, National Institute for Materials Science, Japan

4. Electrophoretic deposition of cellulose nanofibers in aqueous suspensions
   Tomohiko Yoshioka, Okayama University, Japan

5. Preparation of BaTiO3 nanotube arrays, CoFe2O4 nanoparticles and their composite
   Wai Kian Tan, Toyohashi University of Technology, Japan

6. Anisotropic a-Fe2O3/chitosan Nanocomposites by electrophoretic deposition
   Laura Ramos Rivera, FAU Erlangen-Nuremberg, Germany

7. Seed layers for the growth of oriented vertical arrays of ZnO nanorods
   Ondřej Černohorský, Institute of Photonics and Electronics, AS CR, v.v.i., Czech Republic

8. Investigation of affecting parameters of Electrophoretic deposition (EPD) method in (Bi0.5Na0.5)TiO3-Hexagonal BaTiO3 and their properties
   Minsu Kim, University of Yamanashi, Japan

9. Influence of substrate morphology on ZnO nanostructures grown by electrophoretic deposition
   Omar Alejandro Espindola, Universidad Nacional de Tucumán, Argentina

10. In-Situ USAXS/SAXS investigation of tunable structural color in amorphous photonic crystals during electrophoretic deposition
    Scott Bukosky, Lawrence Livermore National Laboratory, USA

11. In vitro characterization of a biodegradable chitosan/bioactive glass coating for Mg alloys
    Svenja Heise, Friedrich-Alexander University Erlangen-Nuremberg, Germany

12. Antibacterial and bioactive coatings based on electrophoretic deposition of chitosan/bioactive glass/lawsone on PEEK/bioactive glass layers
    Muhammad Atiq Ur Rehman, University of Erlangen-Nuremberg, Germany

13. Effect of surface modifiers on the nanoparticles electro-driven assembly
    Joaquín Luis Yus Domínguez, ICV-CSIC, Spain