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Electrophoretic Deposition VII: Fundamentals
and Applications

Proceedings

10-30-2022

ELECTROPHORETIC DEPOSITION VII: FUNDAMENTALS AND APPLICATIONS

Aldo R. Boccaccini

Begoña Ferrari

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Tetsuo Uchikoshi

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Program

7th International Conference on
**Electrophoretic Deposition:
Fundamentals and Applications**

October 30 – November 3, 2022
Santa Fe, New Mexico, USA

Conference Chair

Prof. Aldo R. Boccaccini

Department of Materials Science and Engineering
University of Erlangen-Nuremberg, Germany

Conference Co-Chairs

Dr. Begoña Ferrari

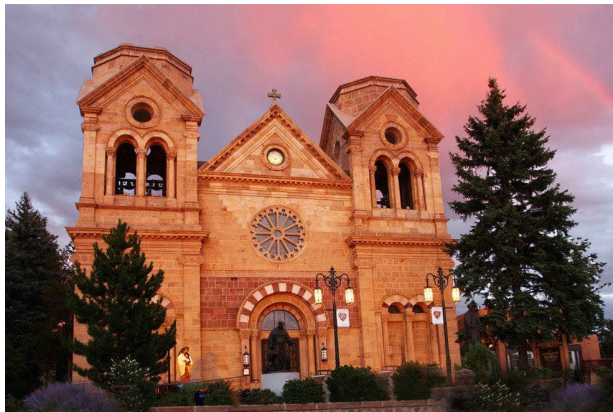
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Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

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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 Unviersiteit 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 Unviersiteit 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 Unviersiteit 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 Unviersiteit 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 Unviersiteit Leuven, Belgium

T. Uchikoshi, National Institute of Materials Science, Tsukuba, Japan

James Dickerson, Vanderbilt University, USA

**6th International Conference on Electrophoretic Deposition:
Fundamentals and Applications**

October 1 - 6, 2017

Gyeongju, South Korea

Conference Chairs:

Aldo R. Boccaccini, Imperial College of Science, London, UK

Omer Van der Biest, Katholieke Unviersiteit Leuven, Belgium

T. Uchikoshi, National Institute of Materials Science, Tsukuba, Japan

James Dickerson, Vanderbilt University, USA



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Sunday, October 30, 2022

16:30 – 18:45	Conference check-in (Mezzanine)
18:45 – 19:00	Opening Remarks – Conference chairs and ECI liaison and Pre-Dinner Social
19:15 – 21:00	Dinner

Locations and Notes

- *Technical sessions will be in Ballroom South.*
- *Meals will be in La Terraza and Garden Terrace.*
- *The ECI on site office will be in the Stiha Room.*
- *Please wear your mask except when giving a presentation or actively eating or drinking. Please maintain physical distancing as much as possible.*
- *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 the author and ECI have granted prior permission.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3-5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your mobile telephones to vibrate or off during technical sessions.*
- *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.*
- *Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.*

Monday, October 31, 2022

08:00 – 09:00 Breakfast

Session 1: Process Fundamentals I

Chairs: Begoña Ferrari, Paula M. Vilarinho

09:00 – 09:45 **KEYNOTE**

Role Of Suspension Media For Electrophoretic Deposition: The Case Of Functional Oxides

Paula M. Vilarinho, Department of Materials and Ceramic Engineering, CICECO - Aveiro Institute of Materials, University of Aveiro, Portugal

09:45 – 10:15 Elucidating the Role of Electrophoretic Mobility for Increasing Yield in the Electrophoretic Deposition of Nanomaterials

Prabal Tiwari, Department of Materials Science and Engineering, University of Florida, USA

10:15 – 10:45 Discussion: What Do We (Do Not) Know About the EPD Mechanisms

Moderators: **Begoña Ferrari, Paula M. Vilarinho**

10:45 – 11:15 Coffee / Tea Break

Session 2: Biomaterials I

Chairs: Aldo R. Boccaccini, Tomas Moskalewicz

11:15 – 12:00 **KEYNOTE**

Electro-Bio-Fabrication: Diverse Routes To Functional Films/Hydrogels

Gregory F. Payne, Institute for Bioscience and Biotechnology Research, University of Maryland, USA

12:00 – 12:30 Biomolecule Coupling Using Alternating Current Electrophoretic Deposition: Protein; Enzyme and Polysaccharide Coatings

Merve Kübra Aktan, KU Leuven Department of Materials Engineering (MTM), Belgium

12:30 – 13:00 Electrophoretic Deposition of Multicomponent Coatings Incorporating Biopolymers, Phytotherapeutics and Bioactive Glass for Biomedical Applications

Zoya Hadzhieva, Institute of Biomaterials, Department of Materials Science and Engineering, University of Erlangen-Nuremberg, Germany

13:00 – 14:30 Lunch

14:30 – 16:30 *Ad hoc* discussions, free time

16:30 – 17:00 Coffee / Tea Break

Monday, October 31, 2022 (continued)

Session 3: Functional Materials I

Chairs: Paula Vilarinho, Kiyofumi Katagiri

- 17:00 – 17:30 Design and properties of polyimides with electrodeposition ability for high performance insulators
Takashi Yamashita, Tokyo University of Technology, Japan
- 17:30 – 18:00 Examples of Studies on Electrophoretic Deposition Process of Functional Thin Films
Fabien Grasset, CNRS-Saint Gobain-NIMS IRL3629, Research Center for Functional Materials, NIMS, Tsukuba, Japan ; CNRS-University of Rennes 1 Rennes, France
- 18:00 – 18:30 Nanoarchitectonic photoelectrodes built-up from octahedral metal atom cluster-based building blocks for solar cell applications
Adèle Renaud, Univ Rennes, CNRS, ISCR – UMR 6226, F-35000 Rennes, France
- 18:30 – 19:00 High Frequency Characterization and Nonlinear Analysis of BST Thick Films Produced by Electrophoretic Deposition
Paula M. Vilarinho, Department of Materials and Ceramic Engineering, CICECO - Aveiro Institute of Materials, University of Aveiro, Portugal
- 19:00 – 19:30 Discussion: Is EPD the technique choice for functional thin films? Pros and Cons
Moderator: **Fabien Grasset**
- 19:30 – 21:00 Dinner
- 21:00 – 22:00 Poster session and Social Networking

Tuesday, November 1, 2022

07:00 – 08:30

Breakfast

Session 4: Process Fundamentals II

Chairs: Kevin Ryan, Federico Smeacetto

09:00 – 09:45

KEYNOTE

Structurally Colored Coatings Composed of Colloidal Arrays Prepared by Electrophoretic Deposition

Kiyofumi Katagiri, Hiroshima University, Japan

Session 5: Biomaterials II

Chairs: Gregory Payne, Zoya Hadzhieva

09:45– 10:30

KEYNOTE

EPD and Characterization of Graphite Oxide/Hydroxyapatite/Sodium Alginate Coatings Incorporated with Si₃N₄ or CuO Nanoparticles on Titanium Biomaterials

Tomasz Moskalewicz, AGH University of Science and Technology, Faculty of Metals Engineering and Industrial Computer Science, Kraków, Poland

10:30 – 11:00

Coffee / Tea Break

11:00 – 11:30

EPD Technology for Functionalizing 3D Printing Scaffolds

Begoña Ferrari, Institute of Ceramic and Glass, CSIC, Madrid, Spain

11:30 – 12:30

General discussion: Electrophoretic deposition as technique of choice for antibacterial coatings on metallic implants?

Aldo R. Boccaccini, Institute of Biomaterials, University of Erlangen-Nuremberg, Germany

13:00 – 14:30

Lunch

14:30 – 16:15

Ad hoc discussions, free time, visit Santa Fe

16:15 - 16:45

Coffee and tea

Session 6: Functional Materials II

Chairs: Andrew J. Pascall, Fabien Grasset

16:45 – 17:15

Selective absorbers based on carbon nanotube coating from Electrophoretic Deposition

Guillaume Toquer, ICSM, Univ Montpellier, CEA, CNRS, ENSCM, Bagnols sur Cèze, France

17:15 – 17:45

Electrophoretic Deposition for National Security Applications

Andrew J. Pascall, Lawrence Livermore National Laboratory

Tuesday, November 1, 2022 (continued)

- 17:45 – 18:15 Electrophoretic Deposition of Advanced Ceramic Coatings for High Temperature Corrosion Protection of Steel Interconnects for Solid Oxide Cells
Justyna Ignaczak, Gdańsk University of Technology, Poland
- 18:15 – 18:45 Advances in the Electrophoretic Process to Control Oxide Coatings Microstructure
Sandrine Dulaud, CIRIMAT, Université de Toulouse, CNRS, Université Toulouse 3 Paul Sabatier, Toulouse, France
- 19:00 – 19:30 Manufacturing Tin Films Through A One-Step Processing Method: Shaping and Sintering by EPD
Antonio Javier Sanchez Herencia, Institute of Ceramic and Glass, CSIC, Madrid, Spain
- 19:30 – 21:00 Dinner on Your Own in Santa Fe

Wednesday, November 2, 2022

07:00 – 08:30 Breakfast

Session 7: Energy & Electronics I

Chairs: Bret N. Flanders, Antonio Javier Sanchez Herencia

09:00 – 09:45 **KEYNOTE**

Electrophoretic Deposition of Ceramic Coatings for Solid Oxide Cells: Challenges and Perspectives

Federico Smeacetto, Department of Applied Science and Technology, Politecnico di Torino, Italy

09:45 – 10:30 **KEYNOTE**

Nanorod EPD: A Viable Route to Layer-by-Layer Assembly with Application to Solar Cells, Photonics and Batteries

Kevin Ryan, University of Limerick, Ireland

10:30 – 11:00 Coffee / Tea Break

11:00- 11:45 **KEYNOTE**

Assembling Nanoscale Building Blocks Through Electrophoretic Deposition For Batteries, Supercapacitors, Catalysis, And Printable Electronics

Richard Robinson, Cornell University; USA

Session 8: Online session

Chair: Aldo R. Boccaccini

11:45 – 12:15 **KEYNOTE**

Biomimetic strategies for surface modification, dispersion, charging and electrophoretic deposition of materials

Igor Zhitomirsky, McMaster University; Canada

12:15 – 12:35 In vivo applications of neuronal electrodes structured with laser-generated platinum nanoparticles by electrophoretic deposition

Christoph Rehbock, University of Duisburg-Essen; Germany

12:15 – 12:55 Rapid fabrication of colloidal crystal assisted by electrophoretic deposition technique

Tetsuo Uchikoshi, National Institute for Materials Science and Hokkaido University, Japan

Wednesday, November 2, 2022 (continued)

12:55 – 13:15 Electrofabrication and Characterization of Multifunctional, Asymmetric Bilayer Films Based on Chitosan-Gelatin and Mesoporous Bioactive Glass Nanoparticles for Guided Bone Regeneration
Muhammad Asim Akhtar, University of Erlangen-Nuremberg, Germany

13:15 – 13:35 Bending strength of multi-layered alumina with controlled residual stress
Tohru S. Suzuki, National Institute for Materials Science, Japan

13:35 – 14:30 Lunch

Session 9: Process Fundamentals III

Chairs: Richard Robinson, Andrew J. Pascall

15:30 – 16:00 Numerical Advances in Electrophoretic Deposition in Flow Cells
Andrew J. Pascall, Lawrence Livermore National Laboratory, USA

16:00 – 16:30 Quantifying Electrophoretic Deposition of Nanocrystal Superlattices Using Quartz Crystal Microbalance
Bret N. Flanders, Department of Physics, Kansas State University, USA

16:30 – 18:00 **Session 10: General Discussion: The future of EPD**

Chairs: Aldo R. Boccaccini, Begona Ferrari

Topics: EPD as enabling technology in advanced applications, AI in EPD, EPD as AM method, etc.

18:00 -18:45 **Closing**
Chairs: Aldo R. Boccaccini, Begona Ferrari, Andrew J. Pascall

(Future conferences in the series, EPD International network update, research funding proposals, EU ITN project proposal, links to electrochemistry community, etc.)

19:30 – 21:30 Closing Dinner

Thursday, November 3, 2022

Departures

Poster Presentations

1. **Electrophoretic deposition of aramid nanofibers and carbon nanomaterials on carbon fibers**
Sandrine Duluard, CIRIMAT, Université de Toulouse, CNRS, Université Toulouse 3 Paul Sabatier, Toulouse, France
2. **Modelling of Electrophoretic Deposition (EPD) of soft particles and experimental verification**
Begoña Ferrari, Institute of Ceramic and Glass, CSIC, Madrid, Spain
3. **Electrophoretic deposition of zein/bioactive glass composite coatings doped with F and Cu on titanium for biomedical applications**
Zoya Hadzhieva, University of Erlangen-Nuremberg, Erlangen, Germany

Engineering Conferences International

Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program that has served the engineering/scientific community since 1962 as successor program to Engineering Foundation Conferences. ECI has received recognition as a 501(c)3 organization by the U.S. Internal Revenue Service and is incorporated in the State of New York as a not-for-profit corporation.

The program has been developed and is overseen by volunteers both on the international Board of Directors and international Conferences Committee. More than 1,900 conferences have taken place to date. The conferences program is administered by a professional staff and the conferences are designed to be self-supporting.

ECI Mission

To serve the engineering/scientific community with international, interdisciplinary, leading edge engineering research conferences

ECI Purposes

The advancement of engineering arts and sciences by providing a forum for the discussion of advances in the field of science and engineering for the good of mankind by identification and administration of international interdisciplinary conferences

To work with engineering, scientific and social science societies and the interested general public to jointly sponsor conferences and to take other actions that will foster complementary programming.

To initiate conferences that will have a significant impact on engineering education, research practice and/or development.

ECI Encouragement of New Conference Topics

The ECI Conferences Committee invites you to suggest topics and leaders for additional conferences and encourages you to submit a proposal for an ECI conference.

Ideally, proposals should be submitted from 18 to 24 months in advance of the conference although the staff can work on a shorter timeline.

The traditional format for an ECI conference is registration Sunday afternoon with technical sessions held each morning and evening through Thursday or Friday noon. Afternoons are used for informal gatherings, poster sessions, field trips, subgroup meetings and relaxation. This format has served well to build important professional networks in many areas.

ECI welcomes proposals for shorter conferences and for conferences which span weekends in order to reduce the number of working days participants are away from their offices.

ECI Works With You

ECI works with conference chairs in two complementary ways. First, an experienced member of the Conferences Committee acts as your technical liaison from the proposal stage through the conference itself. He or she is always available to consult with you on any conference issue.

Second, after your proposal has been approved by the Conferences Committee, the ECI staff will assume responsibility for the administration of the conference.

Your primary responsibilities will be recruiting the organizing committee, developing the technical program and securing third-party funding necessary to support the travel of key speakers.

The responsibilities of ECI's "full service" staff include -- but are not limited to -- the following:

- Recommend, negotiate, contract and make substantial deposits for housing, meals, meeting space, A/V equipment and tours.
- Maintain web sites for the conference and for submission of abstracts.
- Publicize via electronic and print media.
- Administer all finances including grants, contributions and purchase orders. (ECI makes grant funds available as soon as a grant is approved.) There is no need for chairs to set up a conference bank account or file tax returns for their conference.
- Process all applications and registrations.
- Produce bound program/abstracts book.
- Contract for the publication of print or electronic proceedings, if any.
- Provide on-site staff during the conference.

For more information, please contact the ECI Director at Barbara@engconfintl.org



Engineering Conferences International

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Calendar of ECI Conferences

Celebrating 60 years of international, interdisciplinary engineering conferences

2022

- Oct 2-7 **21AN** **NANOMECHANICAL TESTING IN MATERIALS RESEARCH AND DEVELOPMENT VIII** (Split, Croatia)
S. Korte-Kerzel, RWTH Aachen University
- Oct 9-13 **22AA** **INTEGRATED CONTINUOUS BIOMANUFACTURING V** (Sitges, Spain)
J. Walther, Sanofi; A. Azevedo, Instituto Superior Técnico; R. Deshpande, Amgen
- Oct 30-Nov 3 **20AE** **ELECTROPHORETIC DEPOSITION VII: FUNDAMENTALS AND APPLICATIONS** (Santa Fe, New Mexico)
A.R. Boccaccini, Univ. of Erlangen-Nuremberg; B. Ferrari, Spanish Research Council; A.J. Pascall, Brookhaven National Laboratory; T. Uchikoshi, National Institute for Materials Science
- Nov 13-18 **21AS** **CERAMIC MATRIX COMPOSITES II** (Santa Fe, New Mexico)
Y. Kagawa, Tokyo University of Technology; R. Darolia, GE Aviation (retired); R. Raj, University of Colorado; G. Singh, Kansas State University; D. Koch, University of Augsburg; G. Vignoles, University of Bordeaux; J. Binner, University of Birmingham
- Dec 10-14 **21AB** **POLYMER REACTION ENGINEERING XI** (Scottsdale, AZ)
T. McKenna, Université Claude Bernard, France; C. Sayer, Federal University of Santa Catarina, Brazil; J. Schork, Georgia Tech; USA; John Tsavalas, University of New Hampshire, USA; Jose Ramon Leiza, University of the Basque Country, Spain; Robin Hutchinson (Queen's University, Canada); Brian Greenhalgh, ExxonMobil Chemicals, USA; Markus Busch, TU Darmstadt, Germany; J. Reimers, ExxonMobil Chemicals, USA
- Dec 18-21 **20AY** **ADVANCES IN COSMETIC FORMULATION DESIGN II** (Durham, NC)
S. Amin, Manhattan College; P. Somasundaran, Columbia University

2023

- March 19-24 **22AD** **ELECTRIC FIELD ENHANCED PROCESSING OF ADVANCED MATERIALS III: COMPLEXITIES AND OPPORTUNITIES** (Tomar, Portugal)
R. Raj, University of Colorado at Boulder; Luis Perez-Maqueda, CICA, Spain
- April 23-29 **23AC** **CELL CULTURE ENGINEERING XVIII** (Cancun, Mexico)
L. Palomares, IBT-UNAM; C. Goudar, Amgen; T. Wang, Roche
- May 7-12 **23AP** **PYROLIQ II – 2023: Pyrolysis and Liquefaction of Biomass and Wastes** (Hernstein, Austria)
F. Berruti, ICFAR & Western University; A. Dufour, CNRS, ENSIC; M. Garcia-Perez, Washington State University; W. Prins, University of Ghent
- May 14-17 **23AU** **2017 INTERNATIONAL CONFERENCE ON SEMICONDUCTOR TECHNOLOGY FOR ULTRA LARGE SCALE INTEGRATED CIRCUITS AND THIN FILM TRANSISTORS (ULSIC VS TFT 8)** (Hokkaido, Japan)
Y. Kuo, Texas A&M University
- May 28-June 2 **21AG** **ALKALI ACTIVATED MATERIALS AND GEOPOLYMERS: SUSTAINABLE CONSTRUCTION MATERIALS AND CERAMICS MADE UNDER AMBIENT CONDITIONS** (Cetraro (Calabria), Italy)
W.M. Kriven, University of Illinois at Urbana-Champaign; C. Leonelli, Università degli Studi di Modena e Reggio Emilia; J.L. Provis, University of Sheffield; A.R. Boccaccini, University of Erlangen-Nuremberg
- June 11-15 **21AO** **ADVANCES IN OPTICS FOR BIOTECHNOLOGY, MEDICINE AND SURGERY** (Tomar, Portugal)
M. Niedre, Northeastern University; F. Leblond, Polytechnique Montreal

July 16-21	21AV	SIXTH INTERNATIONAL WORKSHOP ON STRESS-ASSISTED CORROSION DAMAGE (Washington, DC area) A.K. Vasudevan, Office of Naval Research (retired); R. Latanision, Exponent, Inc.; H. Holroyd, Luxfer (retired); F. Friedersdorf, Luna Innovations Inc.
July 24-28	21AH	ASSOCIATION IN SOLUTION V (Azores, Portugal) I. Voets, Eindhoven University of Technology; J. Strakel, Wageningen University; J. Conrad, University of Houston
Summer	20AF	SYNTACTIC AND COMPOSITE FOAMS VI (TBA-Europe) G.M. Gladysz and K.K. Chawla, University of Alabama at Birmingham; A. R. Boccaccini, University of Erlangen- Nuremberg; M. Fukushima, National Institute of Advanced Industrial Science and Technology
August TBA	20AB	INNOVATIVE MATERIALS FOR ADDITIVE MANUFACTURING (IMAM) (Santa Ana Pueblo, New Mexico) D. Schmidt (Luxembourg Institute of Science and Technology (LIST); N. Gupta, New York University; E. Eastwood, DOE; B.G. Compton; University of Tennessee, Knoxville; G.M. Gladysz, Los Alamos National Laboratory
September 10-13	23AT	SINGLE USE TECHNOLOGIES VI (Boston, USA) M. Barbaroux, Sartorius; S. Kane, Takeda; S. Yoon, University of Massachusetts, Lowell
September 17-21	23-AH	INTERNATIONAL HYDROGEN CONFERENCE: UNDERSTANDING HYDROGEN-MATERIALS INTERACTIONS (Park City, Utah) M. Martin, NIST; J. Burns, University of Virginia
September 17-21	23AB	BIO-CHAR III (Tomar, Portugal) F. Berruti, Western University, Canada; D. Chiamonti, Politecnico di Torino and RE-CORD, Italy; S. Fiore, Politecnico di Torino, Italy; M. Garcia-Perez, Washington State University, USA; O. Masek, University of Edinburgh, UK
October TBA	23AE	ENZYME ENGINEERING XXVII (Singapore) Ang Ee Lui, A*Research, Singapore; Li Zhi, National University of Singapore; Yan Feng, Shanghai Jiao Tong University
Nov TBA	20AO	NONSTOICHIOMETRIC COMPOUNDS VIII (Tainan, Taiwan) W. Chueh, Stanford University; F-Z Fung, National Cheng Kung University; R. Waser, RWTH Aachen; H. Takamura, Tohoku University
<u>2024</u>		
January 7-12	20AT	TRANSITION OF ENERGY SYSTEMS TOWARDS SUSTAINABILITY (India TBA) S. De, S. Bandyopadhyay, IIT, Bombay
February 4-8	24AT	ADVANCING MANUFACTURE OF CELL AND GENE THERAPIES VIII (Coronado, CA) F. Masri, Cell & Gene Catapult; C. Yeager, Georgia Institute of Technology; G. Maheshwari, BMS; J. Moscariello, BMS
February TBA	21AD	ADVANCED MEMBRANE TECHNOLOGY VIII: ENVIRONMENT, FOOD, HEALTH AND NEW FRONTIERS (Casablanca, Morocco) J. Hestekin, University of Arkansas; U. Beusche, W.L. Gore, Inc.; D. Bhattacharyya, University of Kentucky
April 4-7	20AP	DELIVERY OF NUCLEIC ACID THERAPEUTICS II: BIOLOGY, ENGINEERING AND DEVELOPMENT (Siracusa, Sicily) L. Sepp-Lorenzino, Intellia Therapeutics; S. F. Dowdy, University of California San Diego School of Medicine; M. Stanton, Generational Bio
Spring	24AI	ULTRA-HIGH TEMPERATURE CERAMICS: MATERIALS FOR EXTREME ENVIRONMENT APPLICATIONS V (Italy) D. Sciti, Institute for Science and Technology of Ceramics, CNR;
April TBA	24AK	MICROBIAL ENGINEERING III (TBA) E. Keshavarz-Moore, University College London; T. Sauer, Sanofi
May 19-24	24AA	VACCINE TECHNOLOGY IX (Los Cabos, Mexico) C. Lutsch, Sanofi Pasteur; L. Lua, University of Queensland; F. Godia, Universitat Autònoma de Barcelona; T. Tagmyer, Merck

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