



European Materials Research Society

Spring Meeting 2022

May 30 | June 3
Virtual Conference

SYMPOSIUM 5

Polymer and hybrid thin films deposited
from the vapor phase for functional (bio-devices)

Symposium Organizers :

Anna Maria COCLITE, Graz University of Technology

Meike KOENIG, Karlsruhe Institute of Technology

Nicolas BOSCHER, Luxembourg Institute of Science and Technology (LIST)

Rong YANG, Cornell University, USAMail : ryang@cornell.edu

To be published in ???

Monday may 30

08:45 Welcome and Introduction to the Symposium

Biomaterials part I : Anna Maria Coclite

09:00 **INV Surface Hydrophobicity Modulates the Key Characteristics of Cancer Spheroids through the Interaction with the Adsorbed Proteins** S 1.1
Sung Gap Im
Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST)

09:30 **Aero-hydrogels via initiated Chemical Vapor Deposition for application as cell scaffolds** S 1.2
Torge Hartig¹, Wiebke Reichstein¹, Margarethe Hauck², Gabriel Chan¹, Mohammadreza Taale³, Christine Arndt³, Florian Rasch², Maximilian Burk¹, Thomas Strunskus¹, Christine Selhuber-Unkel³, Rainer Adelung², Franz Faupel¹, Stefan Schröder¹, Fabian Schütt²
¹Chair for Multicomponent Materials, Institute of Materials Science, Kiel University, Kiel, Germany ²Functional Nanomaterials Chair, Institute of Materials Science, Kiel University, Kiel, Germany ³Institute for Molecular Systems Engineering, Heidelberg University, Heidelberg, Germany

09:45 **Coating of functional patches for use in biomedical applications** S 1.3
Eda Güney (1)*, Beril Üstünkaya (1), Bengü Sueda Şengül (1), Gozde Ozaydin Ince (1,2)
(1) Materials Science and Nanoengineering Department, Faculty of Engineering and Natural Sciences, Sabanci University, 34956, Istanbul, Turkey (2) Sabanci University Nanotechnology Research and Application Center (SUNUM), Sabanci University, 34956, Istanbul, Turkey

10:00 **Innovative parylene-based multilayers using low temperature CVD technologies** S 1.4
Sébastien Buchwalder *(1,3), Juan Jose Diaz Leon (2), Antoine Descoeudres (2), Jérôme Steinhauser (3), Aurelio Borzi (4), Antonia Neels (4), Andreas Hogg (3), Jürgen Burger (1)
(1) sitem Center for Translational Medicine and Biomedical Entrepreneurship, University of Bern, Switzerland, (2) CSEM PV-Center, Neuchâtel, Switzerland, (3) Coat-X SA, Switzerland, (4) Empa Center for X-ray Analytics, Swiss Federal Laboratories for Materials Science and Technology, Switzerland, * lead presenter

10:15 Discussion 1

10:30 Coffee

Biomaterials part II : Meike Koenig

10:45 **INV Atmospheric-pressure plasma deposition of functional silicon-based thin films and their application in biomaterials** S 2.1
Matteo Gherardi, Vittorio Colombo, Romolo Laurita, Giulia Laghi
Industrial Engineering Department (DIN) & Industrial Research Centre for Advanced Mechanics and Materials (CIRI-MAM) at Alma Mater Studiorum-Università di Bologna, Industrial Engineering Department (DIN) & Industrial Research Centre for Advanced Mechanics and Materials (CIRI-MAM) at Alma Mater Studiorum-Università di Bologna, Industrial Engineering Department (DIN) & Industrial Research Centre for Health and Technology (CIRI-SDV) at Alma Mater Studiorum-Università di Bologna, Industrial Engineering Department (DIN) at Alma Mater Studiorum-Università di Bologna,

11:15 **INV Plasma polymers as a versatile platform for cell attachment and proliferation** S 2.2
Lenka Zajíčková, Lucie Blahová, Martina Buchtelová, David Nečas, Jiřina Medalová, Petra Křížková, Anton Manakhov, Anastasiya O. Solovieva, Zdeňka Kolská, Dirk Hegemann
CEITEC Brno University of Technology & Masaryk University, Brno, Czech Republic, CEITEC Brno University of Technology, Czech Republic, CEITEC Brno University of Technology, Czech Republic, CEITEC Brno University of Technology, Czech Republic, Masaryk University, Brno, Czech Republic, Masaryk University, Brno, Czech Republic, Research Institute of Clinical and Experimental Lymphology—Branch of the ICG SB RAS, Novosibirsk, Russia, Research Institute of Clinical and Experimental Lymphology—Branch of the ICG SB RAS, Novosibirsk, Russia, J.E. Purkyně University, Ústí nad Labem, Czech Republic, Empa, St. Gallen, Switzerland

11:45 Discussion 2

13:30 **Novel aerosol assisted plasma deposition of PEG containing coatings for non-fouling application** S 3.1
Annalisa Treglia, Fabio Palumbo, Roberto Gristina, Pietro Favia
Annalisa Treglia, Pietro Favia Department of Chemistry, University of Bari "Aldo Moro", Bari, Italy Fabio Palumbo, Roberto Gristina Institute of Nanotechnology, National Research Council, Bari, Italy

13:45 **Rapid antibacterial activity by plasma-deposited AgOx-doped TiOx catalysts** S 3.2
Dirk Hegemann, Qun Ren, Patrick Rupper
Empa, Swiss Federal Laboratories for Materials Science and Technology, St.Gallen, Switzerland

14:00 **Plasma-assisted deposition of fluorinated silane thin films for antimicrobial applications** S 3.3
Laghi G.*(1), Colombo V.(1),(2),(3),(4), Condorelli G.G.(5), Conoci S.(6),(7), Franco D.(6),(7), Gallerani R.(1), Guglielmino S.(6), Laurita R.(1),(2),(8), Morganti D.(7), Traina F.(7),(9) & Gherardi M.(1),(2),(3),(4)
(1) Department of Industrial Engineering, Alma Mater Studiorum-University of Bologna, Bologna, Italy (2) AlmaPlasma s.r.l., Viale G. Fanin 48, 40127 Bologna, Italy (3) Interdepartmental Centre for Industrial Research Advanced Mechanical Engineering Applications and Materials Technology, Alma Mater Studiorum-University of Bologna, Bologna, Italy (4) Interdepartmental Centre for Industrial Research Agrifood, Alma Mater Studiorum-University of Bologna, Bologna, Italy (5) Department of Chemical Science, University of Catania, Catania, Italy (6) Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina, Italy (7) IBMTech s.r.l., Via Napoli 116, 95127 Catania, Italy (8) Interdepartmental Centre for Industrial Research Health Sciences and Technologies, Alma Mater Studiorum-University of Bologna, Bologna, Italy (9) Department of Biomedical and Neuromotor Sciences, Alma Mater Studiorum-University of Bologna, Bologna, Italy

14:15 **INV Addressing Biosensor Fouling with Thin Polymer Films Created via Photoinitiated Chemical Vapor Deposition** S 3.4
Trisha L. Andrew, Ruolan Fan, Kwang-Won Park, Peiyao Zhao
University of Massachusetts Amherst

14:45 **Initiated Chemical Vapor Deposition on microstructures to inhibit biofilm formation** S 3.5
Amelia Whiteley, Guillaume Nonglaton, Vincent Jousseume
Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble, Univ. Grenoble Alpes, CEA, LETI, F-38000 Grenoble

15:00 **INV MAKING POLYMERS FROM VAPORS: TOWARDS CHEMICAL, TOPOLOGICAL AND BIOLOGICAL CONTROLLED BIOINTERFACES** S 3.6
Joerg Lahann
Biointerfaces Institute, University of Michigan, Ann Arbor, MI 48109, USA

15:30 Discussion 3

15:45 Coffee

Thin films for energy : Nicolas Boscher

16:00 **INV Chemical vapor deposition of polymers for biomedical and energy applications** S 4.1
Afshin Dianatdar, Advrit Mukherjee, Giovanni Fortunato, Ranjita K. Bose
University of Groningen

16:30 **Engineering Fused Ni(II) Porphyrin polymer: Effect of Substituent on Electrochemical and Opto-electronic Properties** S 4.2
Deepak Bansal
Luxembourg Institute of Science and Technology

16:45 **INV Vapor Phase Deposition of Organic Frameworks and Networks** S 4.3
Siamak Nejati Syed Ibrahim Gnani Peer Mohammad
University of Nebraska

17:15 **INV Hybrid Ceramic-Polymer Materials for Energy, Sensing, and Sustainability** S 4.4
B. Reeja-Jayan
Department of Mechanical Engineering, Carnegie Mellon University

17:45 Discussion 4

Tuesday may 31

Biomaterials part III : Meike Koenig

09:00 **INV Vapor-Phase Fabrication of Polymer Coatings, Device, Particles, and Porous Scaffolds** S 5.1
Hsien-Yeh Chen
Department of Chemical Engineering, National Taiwan University

09:30 **Tough, Stretchable and Recyclable Copolymer with High Stability, Transparency and Processability for Wearable Bio-electronics** S 5.2
Gargi Ghosh, Nae-Eung Lee
Gargi Ghosh, Nae-Eung Lee School of Advanced Materials Science & Engineering, Sungkyunkwan University, Suwon, Gyeonggi-do 16419, Republic of Korea, Nae-Eung Lee SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, Suwon, Gyeonggi-do 16419, Republic of Korea, Research Centre for Advanced Materials Technology, Sungkyunkwan University, Suwon, Gyeonggi-do 16419, Republic of Korea, Samsung Advanced Institute for Health Sciences & Technology (SAIHST), Sungkyunkwan University, Suwon, Gyeonggi-do 16419, Republic of Korea, Institute of Quantum Biophysics (IQB), Sungkyunkwan University Suwon, Gyeonggi-do 16419, Republic of Korea, Biomedical Institute for Convergence at SKKU (BICS), Sungkyunkwan University Suwon, Gyeonggi-do 16419, Republic of Korea.

09:45 **Triboelectric hybrid PVDF-Nylon membrane for enhancing efficiency of particulate matter filtration with sustaining pressure drop** S 5.3
Dong Hee Kang, Hyun Wook Kang
Advanced Fluidics & Nano Technology Lab, Department of Mechanical Engineering, Chonnam National University, Gwangju, Korea, Republic of

10:00 **Discusson 5**

10:15 **Coffee**

Mechanism of deposition/Deposition on patterns : Dirk Hegemann

10:30 **INV Synthesis of chemically patterned films using atmospheric pressure dielectric barrier discharges** S 6.1
Annaëlle Demaude*, Juliette Zveny*, Michael Gordon*, François Reniers*
* Chemistry of Surfaces, Interfaces and Nanomaterials, Université libre de Bruxelles, Brussels, Belgium ° Chemical Engineering Dept. University of California, Santa Barbara, USA

11:00 **Investigating the conformality of organosilicate polymers by iCVD: Challenges and opportunities** S 6.2
Chara Zavvou, Chloé Guérin, Aude Lefevre, Vincent Jousseume
Univ. Grenoble Alpes, CEA, Leti, F-38000 Grenoble

11:15 **INV Plasma polymerization with ambient-pressure dielectric-barrier discharges – insights from single-filament studies** S 6.3
Prof. Claus-Peter Klages, Lars Bröcker
TU Braunschweig, Institute for Surface Technology

11:45 **INV Can we tune the mechanical properties of plasma polymer films by controlling their growth temperature?** S 6.4
Rony Snyders, Nathan Vinx, Pascal Damman, Philippe Leclère, Damien Cossement, Damien Thiry
Chimie des Interactions Plasma-Surface (ChIPS), University of Mons and Materia Nova Research Center, Parc Initialis, Mons Chimie des Interactions Plasma-Surface (ChIPS), University of Mons Interface et Fluides Complexes (Influx), University of Mons Laboratory for Chemistry of Novel Materials (CMN) Materia Nova Research Center, Parc Initialis, Mons Chimie des Interactions Plasma-Surface (ChIPS), University of Mons

12:15 **Discusson 6**

Hybrid thin films : Rong Yang

15:00 **INV Recent advances in the aerosol-assisted atmospheric pressure plasma deposition of hybrid nanocomposite coatings** S 7.1
Fiorenza Fanelli, Antonella Uricchio, Teresa Lasalandra, Gael Plantard, Françoise Massines
National Research Council (CNR), Institute of Nanotechnology (NANOTEC), Bari, Italy, Department of Chemistry, University of Bari "Aldo Moro", Bari, Italy, University of Perpignan Via Domitia, Perpignan, France, Laboratoire Procédés Matériaux et Energie Solaire, PROMES-CNRS, UPR 8521, Perpignan, France

15:30 **INV Hybrid Materials via Vapor Phase Infiltration: The Influence of the Inorganic Component on Chemical, Physical, and Functional Pr** S 7.2
Mark D. Losego
Georgia Institute of Technology

16:00 **Combining initiated chemical vapor deposition and plasma-enhanced atomic layer deposition: a study of initial growth and interfa** S 7.3
Lisanne Demelius, Katrin Unger, Anna Maria Coclite
Institute of Solid State Physics - Graz University of Technology

16:15 **INV Functional Thin Films by Molecular Layer Deposition** S 7.4
Stacey F. Bent
Department of Chemical Engineering, Stanford University

16:45 **Discusson 7**

Wednesday June 1

Porous thin films and multilayers : Junjie Zhao

- 09:00 **INV A change of POREspective: from avoiding to exploiting porosity in organic and inorganic thin films** S 8.1
Alberto Perrotta
National Research Council (CNR) - Institute of Nanotechnology (NANOTEC)
- 09:30 **INV Tailored Polymer Thin Films via Initiated Chemical Vapor Deposition: From Fundamentals to Functional Applications** S 8.2
Stefan Schröder
Institute for Materials Science, Kiel University, Kiel, Germany
- 10:00 **Deposition and evaluation of gradient polymers via initiated chemical vapor deposition (iCVD) for anti-icing applications** S 8.3
Hernandez Rodriguez, G., Coclite, A.M. ghernandezrodriguez@tugraz.at, anna.coclite@tugraz.at
Institute of Solid State Physics, Graz University of Technology, Graz, Austria
- 10:15 **Discussion 8**
- 10:30 **coffee**
- Sensors based on thin films : Junjie Zhao
- 10:45 **Initiated chemical vapor deposition (iCVD) of photoswitchable thin films and freestanding polymer structures** S 9.1
Maximilian H. Burk (1), Stefan Schröder (1), Stefan Rehders (1), Thomas Strunskus (1), Rainer Herges (2) and Franz Faupel (1)
(1) Faculty of Engineering, Kiel University, Kaiserstr. 2, 24143 Kiel, Germany. (2) Otto-Diels-Institute for Organic Chemistry, Kiel University, 24118 Kiel, Germany.
- 11:00 **Multiresponsive Soft Actuators Based on a Thermoresponsive Hydrogel and Embedded Laser-Induced Graphene** S 9.2
Alexander Dallinger, Paul Kindlhofer, Francesco Greco, Anna Maria Coclite
Alexander Dallinger: Institute of Solid State Physics, NAWI Graz, Graz University of Technology, Petersgasse 16, Graz (Austria), Paul Kindlhofer: Institute of Solid State Physics, NAWI Graz, Graz University of Technology, Petersgasse 16, Graz (Austria), Francesco Greco: Institute of Solid State Physics, NAWI Graz, Graz University of Technology, Petersgasse 16, Graz (Austria), The Biorobotics Institute, Scuola Superiore Sant'Anna, Viale R. Piaggio 34, 56025 Pontedera (Italy), Anna Maria Coclite: Institute of Solid State Physics, NAWI Graz, Graz University of Technology, Petersgasse 16, Graz (Austria),
- 11:15 **Smart Core-Shell Nanostructures for Force, Humidity and Temperature Sensing** S 9.3
Taher Abu Ali, Dr. Barbara Stadlober, Prof. Anna Maria Coclite
1. Graz University of Technology, Institute of Solid State Physics 2. Joanneum Research, Institute for Surface Technologies and Photonics
- 11:30 **Oxidative chemical vapor deposition of conductive polymers for flexible piezoresistive polymer composites** S 9.4
Adivit Mukherjee, Sara Selenica, Dr. Ajay G. P. Kottapalli, Prof. Marleen Kamperman, Dr. Ranjita K. Bose
Product Technology, Department of Chemical Engineering, Engineering and Technology Institute (ENTEG), University of Groningen, The Netherlands, Product Technology, Department of Chemical Engineering, Engineering and Technology Institute (ENTEG), University of Groningen, The Netherlands, Advanced Production Engineering (APE), Engineering and Technology Institute Groningen (ENTEG), University of Groningen, The Netherlands, Polymer Science, Zernike Institute for Advanced Materials (ZIAM), University of Groningen, The Netherlands, Product Technology, Department of Chemical Engineering, Engineering and Technology Institute (ENTEG), University of Groningen, The Netherlands
- 11:45 **Hydrogen gas monitoring using a polymer-based conductometric sensor** S 9.5
Iulia ANTOHE1*, Andrei Stochioiu1, Luiza-Izabela JINGA1, Andreea MIHĂILESCU1, Gianina POPESCU-PELIN1, Viad-Andrei ANTOHE2,3 and Gabriel SOCOL1*
1 National Institute for Lasers, Plasma and Radiation Physics, Atomistilor 409, 077125 Magurele, Romania 2 Institute of Condensed Matter and Nanosciences (IMCN), Université Catholique de Louvain, 1348 Louvain-la-Neuve, Belgium. 3 Research and Development Center for Materials and Electronic & Optoelectronic Devices, Faculty of Physics, University of Bucharest, 077125 Măgurele, Romania
* Corresponding authors: iulia.antohe@infipr.ro, gabriel.socol@infipr.ro

- 12:00 **Organic Electrochemical Transistor (OECT) for Real-Time, Electrical quantification of SARS-CoV-2 neutralizing antibodies** S 9.6
Francesco Decataldo, Laura Grumiro, Maria Michela Marino, Francesca Faccin, Catia Giovannini, Martina Brandolini, Giorgio Dirani, Francesca Taddei, Davide Lelli, Marta Tassarolo, Maria Calienni, Carla Cacciotto, Antonio Lavazza, Vittoria Cattani, Beatrice Fraboni, Alessandra Scagliarini and Vittorio Sambri
Department of Physics and Astronomy, Alma Mater Studiorum - University of Bologna Francesco Decataldo, Marta Tassarolo, Maria Calienni, Beatrice Fraboni, Unit of Microbiology, The Great Romagna Hub Laboratory, Pievesestina (Cesena) Laura Grumiro, Maria Michela Marino, Martina Brandolini, Giorgio Dirani, Francesca Taddei, Vittorio Sambri, Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna "Bruno Ubertini" (IZSLER), 25124 Brescia, Italy Francesca Faccin, Davide Lelli, Antonio Lavazza Department of Experimental, Diagnostic and Specialty Medicine- DIMES, University of Bologna Catia Giovannini, Carla Cacciotto, Alessandra Scagliarini, Vittorio Sambri Center for Applied Biomedical Research (CRBA), S.Orsola-Malpighi University Hospital, 40138 Bologna, Italy Catia Giovannini DVM, Department of Veterinary Medical Sciences, University of Bologna Vittoria Cattani

12:15 **Discussion 9**

Thin films for (opto)electronics : Shannan O'Shaughnessy

- 15:00 **INV Correlation of Emulsion Chemistry and Film Morphology for Polymers deposited by RIR-MAPLE** S 10.1
Stiff-Roberts, A.D.*(1)(2) and Zhang, B.(1).
(1)Department of Electrical & Computer Engineering, Duke University, Durham, NC USA (2)University Program in Materials Science & Engineering, Duke University, Durham, NC USA * lead presenter
- 15:30 **Strain-resistant transparent polymer barrier layer for flexible optics by iCVD** S 10.2
Yineng Zhao, Wyatt Tenhaeff
Materials Science Program, University of Rochester, Department of Chemical Engineering, University of Rochester
- 15:45 **INV Thin Film Coatings for Flexible Optics Prepared by Polymer Chemical Vapor Deposition** S 10.3
Wyatt E. Tenhaeff
Department of Chemical Engineering, University of Rochester
- 16:15 **INV Accessing and Utilizing Atypical Deposition Behavior of iCVD and oCVD** S 10.4
Kenneth K. S. Lau
Department of Chemical and Biological Engineering, Drexel University
- 16:45 **In-situ ellipsometry study on multilayer optical coatings** S 10.5
Parinaz Esbah, Wyatt Tenhaeff
Dept. of Chemical Engineering, University of Rochester, Rochester, New York, The United States.
- 17:00 **Discussion 10**

Thursday June 2

Functional thin films : Anna Maria Coclite

- 09:00** **Detection of SARS-CoV-2 Antigens and Antibodies Using OFET Biosensors Based on a Soft and Stretchable Semiconducting Polymers** **S 11.1**
Ditte, K.(1,2), Nguyen Le, T. A.(3,4), Ditzer, O.(1,2), Sandoval Bojorquez, D. I.(3), Chae, S.(1), Bachmann M.(3,4), Baraban, L.(3), Lissel, F.(1,2)
(1)Leibnitz Institute of Polymer Research Dresden e.V., Germany (2)Faculty of Chemistry and Food Chemistry, Dresden Technical University, Germany (3) Institute of Radiopharmaceutical Cancer Research, Helmholtz-Zentrum Dresden-Rossendorf, Germany (4)Faculty of Medicine Carl Gustav Carus, Dresden Technical University, Germany
- 09:15** **Modelling Crystallisation in Polymers** **S 11.2**
Rasha Algerhami, Nigel Clarke
Physics and astronomy department University of Sheffield United Kingdom
- 09:30** **A Solid, Conductive Microfiber for Biodegradable Stretchable Electronics** **S 11.3**
Gargi Ghosh, Nae-Eung Lee
School of Advanced Materials Science and Engineering, Sungkyunkwan University (SKKU), Suwon, Gyeonggi-do 16419, Republic of Korea
- 09:45** **The influence of electron beam irradiations on the mechanical properties of magnesium-doped hydroxyapatite/chitosan coatings** **S 11.4**
A.Groza¹, B.Bita¹, E.Stancu¹, C.Staicu¹, O.Pompilian¹, C.Ciobanu², S.Iconaru², D.Predoi²
¹National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, P.O. Box MG 36, Magurele, 077125 Bucharest, Romania ²National Institute of Materials Physics, Atomistilor Street, No. 405A, P.O. Box MG 07, 077125 Magurele
- 10:00** **Improving the degradation rate of AZ31B alloy coated with Mg and Si doped hydroxyapatite** **S 11.5**
Alina Vladescu¹, Anca C. Parau¹, Diana M. Vranceanu², Iulian Pana¹, Gabriela A. Juravlea¹, Gianfranco Palumbo³, Giuseppina Ambrgio⁴, Cosmin M. Cotrut²
¹National Institute of Research and Development for Optoelectronics - INOE 2000, 409 Atomistilor St., R077125, Magurele, Romania ²University Politehnica of Bucharest, Faculty of Materials Science and Engineering, 313 Spl. Independentei, Bucharest, RO60042, Romania ³Department of Mechanics, Mathematics and Management, Politecnico di Bari, Via Orabona4, 70126, Bari, Italy ⁴Department of Mechanical, Energy and Management Engineering - University of Calabria, P. Bucci, 87036 Rende (CS), Italy
- 10:15** **Multilayer transparent conductive electrode based on guanine** **S 11.6**
M. Socol¹, N. Preda¹, C. Breazu¹, A. Costas¹, G. Petre¹, A. Stanculescu¹, I. Stavarache¹, A. Stochiou², G. Socol², M. Girtan³
¹National Institute of Material Physics, 405A Atomistilor Street, 077125, Magurele, Romania ²National Institute for Lasers, Plasma and Radiation Physics, 409 Atomistilor Street, 077125, Magurele, Romania ³Photonics Laboratory, (LPhiA) E.A. 4464, SFR Matrix, Université d'Angers, Faculté des Sciences, 2 Bd Lavoisier, 49045 Angers, France
- 10:20** **Discussion 11 and Closing remarks**