International Conference on
Polymer Processing in Engineering

Galati, Romania
October 7-9, 2019

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Foreword

Polymer Processing in Engineering (PPE) Conference, held every two years, aims to gather academic researchers and industrial partners involved in the field of polymers.

The PPE 2019 conference covers all of the important areas in the field, from state-of-the-art research and development to characterization, fabrication, technology development, numerical modeling and many new and emerging applications of polymeric materials.

The Polymer Processing in Engineering Proceedings is scheduled to be published in the Plastic Material Journal.

Main Topics of the Conference

Members of industry and scientific community are invited to contribute with presentations on any of the conference topics. Specific topics include, but are not limited to:

- Polymer processing, rheology & rheometry
- Biopolymers & biotechnologies
- Nanopolymers & nanotechnologies
- Polymers, functional surfaces and bio-material interfaces
- Properties of polymers, including thermal, surface and adhesion
- Surface modification of polymers
- Green polymers, reprocessing & recycling
- Mechanical behavior of polymers and polymer composites
- Fracture mechanics of polymers & polymer composites
- Reliability & testing methods
- Product, mould design, & manufacturing processes
- Applications of polymers in industry
- Computational polymers & polymer composites

Welcome

Dear Colleagues,

As the organizers of the PPE2019, and on behalf of the entire polymer processing research and education group at Dunarea de Jos University of Galati, we welcome you to Galati.

A successful conference depends on many dedicated conference organizing committee, technical program committee, symposium organizers, authors, and reviewers. We would like to thank all of the authors for their technical papers and oral presentations, the host Organizing Committee, the Conference Coordinating Committee, the PPE Scientific Committee, and the conference sponsors.

We would also like to thank our keynote speakers, Marc J.M. Abadie, "Petru Poni" Institute of Macromolecular Chemistry, Institute Charles Gerhardt Montpellier/ AIME CNRS, University of Montpellier, France, Adriana-Violeta Mihailescu, Renault Technologie Roumanie, and Viorica Musat, “Dunarea de Jos” Universiry of Galati, for sharing their experience and insight into the challenges of polymer processing and engineering.

We hope you enjoy your visit to “Dunarea de Jos” University of Galati, and find the conference useful in expanding your technical knowledge, as well as your network of contacts within the polymer processing research community. Enjoy the conference!

Loredana SANTO
PPE 2019 Conference Chair

Catalin FETECAU
PPE 2019 Technical Program Chair

PPE 2019 Technical Program

Monday, October 7, 2019

Time	Event	Location
9:00 a.m. – 10:00 a.m.	**Conference Registration**	Hall D
10:00 a.m. – 10:30 a.m.	**Welcome to PPE 2019**	D 12
10:30 a.m. – 11:30 a.m.	***PPE 2019 Keynote*** *Title: Photosensitive Formulation for Additive Manufacturing - 3D Printing* ***Speaker:*** *Marc J.M. Abadie, Professor Emeritus, ICM "Petru Poni", Iasi, Romania, Institute Charles Gerhardt Montpellier/ AIME CNRS, University of Montpellier, France* *Chair: Catalin Fetecau, Dunarea de Jos University of Galati*	D 12
11:30 a.m. - 12:00 a.m.	**Break**	Hall D /B04
12:00 a.m. – 1:00 p.m.	***PPE 2019 Symposium*** *Processing, Testing & Characterization of Polymers and Composites*	D 12
1:10 p.m. – 2:00 p.m.	**Lunch**	Hall D /B04
2:00 p.m. – 2:45 p.m.	***PPE 2019 Industry Presentation*** *Title: Numerical Simulation of Polymer Injection Molding* *Speaker: Adriana-Violeta Mihailescu, Renault Technologie Roumanie* *Chair: Elena Scutelnicu, Dunarea de Jos University of Galati*	D 12
2:45 p.m. - 3:45 p.m.	***PPE 2019 Symposium*** *Processing, Testing & Characterization of Polymers and Composites*	D 12
3:45 p.m. - 4:00 p.m.	**Break**	
4:00 p.m. - 5:00 p.m.	***PPE 2019 Symposium*** *Bio-Polymers & Composites - Materials and Applications*	D 12
5:00 p.m. - 5:40 p.m.	***PPE 2019 Technical Session*** *Additive Manufacturing - Materials and Applications*	D 12
7:00 p.m. - 9:00 p.m.	**Dinner** **Location - First Club**	Hotel Danube Stars

Polymer Processing in Engineering Conference

Galati, 7-9 October 2019

Tuesday, October 8, 2019

Time	Event	Location
9:00 a.m. – 10:00 a.m.	**Conference Registration**	Hall D
10:00 a.m. – 10:45 a.m.	***PPE 2019 Invited Presentation*** *Title: Effect of Biopolymer Grafting on PMMA-based Thin Film Properties for Transparent and Flexible Electronics* *Speaker: Viorica Musat, Professor, Dunarea de Jos University of Galati, Romania* *Chair: Loredana Santo, University of Rome "Tor Vergata"*	D 12
10:45 a.m. – 11:00 a.m.	**Break**	Hall D /B04
11: 00 a.m. – 12:20 p.m.	***PPE 2019 Symposium*** *Polymer Composites & Manufacturing for Circular Economy*	D 12
12:20 p.m. – 1:00 p.m.	***PPE 2019 Symposium*** *Machining of Polymers and Composites - Optimization*	D 12
2:15 p.m. – 4:30 p.m.	**Lunch & Danube River Tour** **(Boat leaves at 2:30 p.m.)**	Meeting point Hotel Danube Stars

Wednesday, October 9, 2019

Time	Event	Location
10:00 a.m. – 12:00 a.m.	***PPE 2019 Workshop on 3D Printing, Demonstrations***	B 03
12:30 p.m. – 2:00 p.m.	**Visit to Museum of History, Culture and Christian Spirituality of the Lower Danube**	Meeting point Hall D

Symposium
Processing, Testing & Characterization of Polymers and Composites

Monday, 12:00 – 1:00, D12
Session: *Processing, Testing & Characterization of Polymers and Composites - I*
Session Chair: *Laurentiu Slatineanu, "Gheorghe Asachi" Technical University of Iaşi*

Paper #	Authors	Paper Title
PPE2019-019	Iorio L.*, Santo L.*, Quadrini F. *, Bellisario D. *, Benedetti D.**, and Agnelli J. ** **Department of Industrial Engineering, University of Rome "Tor Vergata"* ***Carbon Dream SpA, Florence*	Carbon Fiber Laminates with Interlaminar Carbon Nanotubes
PPE2019-013	Cherkasov V.*, Yurkin Y.**, Avdonin V.*, and Suntsov D.** **Applied Mechanics Department, Ogarev Mordovia State University* ***Building Structures and Machines, Department Vyatka State University*	Self-Adhesion X-Ray Shielding Composite Material of EPDM Rubber With Barite: Mechanical Properties
PPE2019-002	Barzic A.I.*, Albu R.M. *, Nechifor C.D.**, Postolache M. ***, and Dorhoi D.O. **** **"Petru Poni" Institute of Macromolecular Chemistry* ***Faculty of Machine Manufacturing and Industrial Management, "Gheorghe Asachi" Technical Universit* ****Faculty of Automatic Control and Computer Engineering, "Gheorghe Asachi" Technical University, Iaş* *****Faculty of Physics, "Alexandru Ioan Cuza" University*	Surface Processing of Polyethylene Terephthalate for Orientation of Nematics in Display Devices

Symposium
Processing, Testing & Characterization of Polymers and Composites

Monday, 2:45 – 3:45, D12 **Session:** *Processing, Testing & Characterization of Polymers and Composites - II* **Session chair:** *Daniel Stan, Politehnica University of Timişoara*		
Paper #	**Authors**	**Paper Title**
PPE2019-006	Barzic A.I.*, Soroceanu M.*, Rotaru R.*, Harabagiu V.* **"Petru Poni" Institute of Macromolecular Chemistry*	Optical Dispersion Characteristics of Polyvinyl Alcohol Reinforced with a Nanoceramic Filler
PPE2019-011	Croitoru E.-I.*, Morariu C.-O.*, Şoica A.**, Oancea Gh.* *Department of Manufacturing Engineering, Transilvania University of Braşov ** Department of Automotive Engineering, Transilvania University of Braşov	Composite Automobile Fender Impact Testing with a Spherical Ball
PPE2019-010	Dodun O.*, Slătineanu L.*, Nagîţ Gh.*, Mareş M.**, Hriţuc A.*, Coteaţă M.*, Beşliu Băncescu I.*** *Department of Machine Manufacturing Technology, "Gheorghe Asachi" Technical University of Iaşi **Department of Mechanical Engineering, Mechatronics and Robotics, "Gheorghe Asachi" Technical University of Iaşi ***Department of Mechanics and Technologies, "Ştefan cel Mare" University of Suceava	Mechanical Properties of Composites Reinforced with Textile

Symposium
Bio-Polymers & Composites - Materials and Applications

Monday, 4:00 – 5:00, D12 **Session:** *Bio-polymers & Composites - Materials and Applications* Session Chair: *Yury Yurkin, Vyatka State University*		
Paper #	**Authors**	**Title**
PPE2019-001	Mirițoiu C.M.*, Stănescu M.M.**, Bolcu D.* **Applied Mechanics and Civil Constructions Department, Faculty of Mechanics, University of Craiova* ***Applied Mathematics Department, University of Craiova*	Researches Regarding the Mechanical Properties of a New Hybrid Vegetable Resin
PPE2019-004	Perdiou A.S.*, Eldin R.A.*, Hajaj K. R.**, Rominu M.*, Sinescu C.*, Meda Negrutiu L.* R. M.*** Negru, Hajaj T.* ** Faculty of Dentistry, Victor Babes University of Medicine and Pharmacy* ***Louis Turcanu Emergency Hospital for Children, Faculty of General Medicine, Victor Babes University of Medicine and Pharmacy* **** Department of Mechanics and Strength of Materials, Politehnica University Timisoara*	A Comparative Evaluation of Stress Resistance Between Nano-Hybrid Composite and Ormocer Restorations on Posterior Teeth - In Vitro Study
PPE2019-014	Volotskoy A.*, Yurkin Y.*, Avdonin V.* **Building Structures and Machines Department, Vyatka State University*	New Thermoplastic Damping Polymeric Materials Based on Ethylene-Vinyl Acetate

Symposium
Additive Manufacturing - Materials and Applications

Monday, 5:00 – 5:40, D12
Session: *Additive Manufacturing - Materials and Applications*
Session chair: *Florin Susac, Dunarea de Jos University of Galati*

Paper #	Authors	Title
PPE2019-015	Stanciu N.V.*, Constantinescu A.M.*, Stan F.*, Fetecau C.* **Center of Excellence Polymer Processing, Dunarea de Jos University of Galati*	Mechanical and Electrical Properties of 3D Printed Sandwich Structures Using Polyoxymethylene/MWCNT Composites and Poly(Lactic)Acid
PPE2019-009	Hrituc A.*, Mihalache A.*, Mares M.**, Coteată M.*, Dodun O.*, Nagît Gh.*, Slătineanu L. * **Department of Machine Manufacturing Technology, Gheorghe Asachi" Technical University of Iaşi* ***Department of Mechanical Engineering, Mechatronics and Robotics, "Gheorghe Asachi" Technical University of Iaşi*	Mechanical Behaviour of 3D Printed PLA Hollow Spherical Parts Under Axial Compression

Symposium
Polymer Composites & Manufacturing for the Circular Economy

Tuesday, 11:00 – 12:20, D12
Session: *Polymer Composites & Manufacturing for Circular Economy*
Session Chair: *Marc J.M. Abadie, ICM "Petru Poni", Iasi, Romania*

Paper #	Authors	Title
PPE2019-020	Santo L.*, Bellisario D.*, Iorio L.*, Papa C.*, Quadrini F.*, Benedetti D.**, Agnelli J. ** **Department of Industrial Engineering, University of Rome "Tor Vergata"* ***Carbon Dream SpA, Florence*	Composite Laminates with Recycled Carbon Fibres and Carbon Nanotubes
PPE2019-016	Sandu I.-L.*, Stanciu N.-V.*, Stan F.*, Fetecau C.* **Center of Excellence Polymer Processing, Dunarea de Jos University of Galati*	Effect of Multiple Recycling on the Mechanical and Rheological Properties of Ethylene-Vinyl Acetate/Multi-Walled Carbon Nanotube Composites
PPE2019-007	Stan D.V.* **Department of Mechatronics, Politehnica University of Timişoara*	Considerations on the Drying of the Raw Material and Consequences on the Quality of the Injected Products
PPE2019-017	Constantinescu A.-M.*, Stan F.*, Fetecau C.* **Center of Excellence Polymer Processing, Dunarea de Jos University of Galati*	Nano-Dynamic Mechanical Properties of Nanocomposites Based on Low Density Polyethylene and Multi-Walled Carbon Nanotubes

Symposium
Machining of Polymers & Composites - Optimization

Tuesday, 12:20 – 1:00, D12
Session: *Machining of Polymers & Composites - Optimization*
Session Chair: *Catalin Fetecau, Dunarea de Jos University of Galati*

Paper #	Authors	Title
PPE2019-012	Susac F.*, Stan F.* * *Center of Excellence Polymer Processing, Dunarea de Jos University of Galati*	Experimental Investigation, Modeling and Optimization of Circularity, Cylindricity and Surface Roughness in Drilling of PMMA Using ANN and ANOVA
PPE2019-021	Baroiu N.*, Costin G.A.*, Teodor V.G.*, Nedelcu D.**, Tăbăcaru V.* **Department of Manufacturing Engineering, Dunarea de Jos University of Galati* ***Faculty of Machine Manufacturing and Industrial Management, Gheorghe Asachi Technical University of Iasi*	Prediction of Surface Roughness in Drilling of Polymers Using a Geometrical Model and Artificial Neural Networks

Polymer Processing in Engineering Conference
Galati, 7-9 October 2019

PPE 2019 Keynote

Photosensitive Formulation for Additive Manufacturing - 3D Printing

Marc JM ABADIE [1, 2]*, Iulian MANOLE [3], Cătălin FETECĂU [3]

[1] Institute Charles Gerhardt Montpellier/AIME CNRS, University of Montpellier, France

[2] "Petru Poni"Institute of Macromolecular Chemistry, Iasi, Romania

[3] Interdisciplinary Research Platform - ReForm UDJG, Center of Excellence Polymer Processing, "Dunărea de Jos" University of Galați, Romania

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Abstract

UV curing is a photochemical process in which high-intensity ultraviolet light is used to instantly cure or "dry" coatings, inks, adhesives and thin film technology. It has been around as a coating for wood, paper and as a clear coating via photolithography process on printed circuit boards PCBs or integrated circuit boards ICBs for years. It is fast becoming one of the most popular techniques in the paint and coatings industry. Most of the formulation use multifunctional acrylate monomers or oligomers or a mixture of them that crosslink under exposure to UV/EB radiations in a free radical process. We briefly present the advantages of EB vs.UV.

A new type of formulation based on multifuctional monomer of dicyclopentadiene epoxy derivative with additional diluent as co-reactive solvent will be described and evaluated. This formulation differs from the acrylate one by the use of a cationic photoinitiator. The final product present all the advantages of epoxy resins viz. better adherence, mechanical and thermal properties, compared to acrylate systems. Formulation has been optimized thanks to the photocalorimetry differential scanning calorimetry DPC. This type of formulation is developed for additive digital manufacturing - 3D Printing (building layer by layer).

Key words: Photopolymerization, Epoxy, Kinetics, 3D printing.

Polymer Processing in Engineering Conference
Galati, 7-9 October 2019

PPE 2019 Invited Presentation

Effect of biopolymer grafting on PMMA-based thin film properties for transparent and flexible electronics

Viorica Musat[1]*, Viorica Ghisman Plescan[1], Ana Pimentel[2], Rodrigo Martins[2], Elvira Fortunato[2]

[1]Centre of Nanostructures and Functional Materials - CNMF, Department of Materials Science and Engineering, Faculty of Engineering, "Dunărea de Jos" University of Galati, Romania

[2]Materials Science Department, CENIMAT/I3N and CEMOP/UNINOVA, Faculty of Sciences and Technology of New University of Lisbon, Campus de Caparica, 2829-516 Caparica, Portugal

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Abstract

In this paper we discuss on the effect of chitosan grafting on the optical and electrical properties of poly(methyl methacrylate) (PMMA)-based thin films, used as dielectric gate into thin film transistors (TFTs) for transparent and flexible electronics.

PMMA is a transparent thermoplastic synthetic polymer with high resistivity, low dielectric constant and good dielectric strength that is very suitable as dielectric gate material in flexible transparent organic thin film transistors (OTFTs) and hybrid field effect transistors (HFETs) for transparent electronics and optoelectronic applications [1-2]. Chitosan (CS) is a natural polymeric biomaterial, derived from chitin, with high transparence foldability, flexibility and good printability that has recently started to be used in flexible and stretchable (FSE) wearable electronics. Due to very good biocompatibility, bioactivity and biodegradability, CSallows the obtaining of bio-based flexible electronic devices such as wireless skin-contact sensors, skin-attachable heater (e-skin) etc. [2-3]. Hybrid thin films obtained by grafting the synthetic polymers with natural polymers, such as CS, at low temperature and low-cost solution processability, aims to increase the biocompatibility but also the biodegradability of devices for emerging sustainable electronics, optoelectronics and bioelectronics [3].

The effect of CS on the optical transmittance in the visible range and the band gap energy (E_g) of the obtained hybrid composite Cs-PMMA thin films, as well as on the leakage current vs voltage and capacitance-voltage (-8 to +8 V range) behavior are discussed. The electrical characterization of CS-PMMA dielectric gate used in experimental TFTs is also presented.

References

[1] L.N. Ismail, et al., *Influence of Doping Concentration on Dielectric*, *Optical, and Morphological Properties of PMMA Thin Films,* Advances in Materials Science and Engineering, 2012, Article ID 605673, 4 pages.

[2] S. Han, et al., *Tailoring the Dielectric Layer Structure for Enhanced Performance of Organic Field-Effect Transistors: the Use of a Sandwiched Polar Dielectric Layer*, Materials 2016, 9, 545.

[3] J.A. Rogers, R. Ghaffari, D.-H. Kim (editors), *Microsystem and Nanosystem. Stretchable Bioelectronics for Medical Devices and Systems*, Springer International Publishing Switzerland, 2016, ISBN 978-3-319-28694-5 (e-book).

Conference venue

Dunarea de Jos University of Galati
Faculty of Engineering
Domnească 111, Galati 800 201, Building D

Conference Sponsors

Acknowledgment

This conference was partially supported by the project "Excellence, performance and competitiveness in the R&D&I activities at "Dunarea de Jos" University of Galati", acronym "EXPERT", financed by the Romanian Ministry of Research and Innovation, Programme 1 – Development of the national research and development system, Sub-programme 1.2 – Institutional Performance – Projects for financing excellence in R&D&I, Contract no. 14PFE/17.10.2018.