

Book of Abstracts



**20th National Symposium
Polymers 2022
Open to International Participation**

July 5 - 8, 2022

Velingrad, Bulgaria

Thursday, July 7th

SESSION 4

Chairpersons: E. Haladjova & S. Turmanova

09:00 – 09:40	PL-4: Barbara Trzebicka Centre of Polymer and Carbon Materials, Polish Academy of Sciences <i>Self-assembling of glycidol copolymers to nanostructures</i>
09:40 – 10:00	OP-13: <u>M. Spasova</u> , N. Manolova, I. Rashkov, M. Naydenov Institute of Polymers, Bulgarian Academy of Sciences <i>Innovative fibrous materials with antifungal activity against esca grapevine disease</i>
10:00 – 10:20	OP-14: <u>E.-D. Lotos</u> , A.-L. Vasiliu, M. Mihai, B. C. Simionescu Petru Poni Institute of Macromolecular Chemistry, Iasi, Romania <i>Composite particles based on zein and polysaccharides</i>
10:20 – 10:40	OP-15: <u>G. Grancharov</u> , M.-D. Atanasova, R. Kalinova, P. Tuleshkov, P. Petrov, S. Simeonov Institute of Polymers, Bulgarian Academy of Sciences <i>Rigid polyurethane foams employing biorenewable oxypropylated pentane-1,2,5-triol</i>
10:40 – 11:10	Coffee break
11:10 – 11:40	KL-5: M. Simeonov, A. Bonchev, K. Ruseva, D. Nikolova, A. Apostolov, P. Shestakova, E. Dyulgerova, <u>Elena Vassileva</u> Sofia University “St. Kl. Ohridski” <i>Polymer/calcium phosphates hybrid materials for biomedical applications</i>
11:40 – 12:00	OP-16: <u>A. Stoyanova</u> , S. Veleva, B. Karamanova, L. Soserov, I. Dimitrov, R. Kalinova, Ch. Novakov Institute of Electrochemistry and Energy Systems, Bulgarian Academy of Sciences <i>Symmetric and hybrid supercapacitors with novel poly(ionic liquid) electrolytes</i>
12:00 – 12:20	OP-17: <u>D. Christova</u> , S. Ivanova, S. Bozhilova, M. Alexandrova, J. Rydz, M. Musioł, H. Janeczek Institute of Polymers, Bulgarian Academy of Sciences <i>Poly(vinyl alcohol) derivatives designed for thin film/membrane applications – synergy of versatile material properties and environmental compliances</i>
12:30 – 14:00	Lunch
14:00 – 17:00	Free time
17:00 – 19:30	Poster presentations (Session 2: P-20 – P-37)
19:30	Dinner

POSTER SESSION I	
P-1	<u>K. Kamenova</u> , S. Simeonov, L. Radeva, K. Yoncheva, A. Forys, B. Trzebicka, P. Petrov Synthesis of pH-sensitive nanogel for controlled delivery of anticancer drugs
P-2	<u>N. Nachev</u> , M. Spasova, N. Manolova, I. Rashkov, M. Naydenov Electrospun polymer-fungicide composites for grapevine protection
P-3	<u>P. Tsekova</u> , U. T. D. Thuy, O. Stoilova, N. Q. Liem Electrospun polymer hybrids containing Mn-doped ZnSe/ZnS nanocrystals with enhanced luminescence
P-4	<u>E. Dimitrov</u> , N. Toncheva-Moncheva, P. Bakardzhiev, R. Stancheva, D. Momekova, A. Forys, B. Trzebicka, S. Rangelov Preparation of polymer amphiphiles for surface modification of niosomes
P-5	<u>R. Stancheva</u> , E. Haladjova, Ts. Paunova-Krasteva, Ts. Damyanova, P. D. Dimitrova, M. Leseva, P. A. Dimitrova, T. Topouzova-Hristova, S. Stoitsova, P. Petrov Drug-loaded mixed polymeric micelles: Preparation, characterization and cytotoxicity trials
P-6	<u>N. Toncheva-Moncheva</u> , E. Dimitrov, D. Momekova, P. Petrov, G. Grancharov, S. Rangelov Synthesis of novel amphiphilic polyglycidol/poly(ϵ-caprolactone) and polyglycidol/poly(α-cinnamyl-ϵ-caprolactone) block copolymers as highly effective cannabidiol-loaded nanocarriers
P-7	<u>E. Mollova</u> , E. Ivanova, S. Turmanova, A. Dimitrov Polymers – pollution and impacts on ecosystems
P-8	<u>E. Ivanova</u> , S. Nedkova, P. Atanasova, S. Turmanova, A. Veli, A. Dimitrov, N. Todorov, V. Georgieva, B. Midyurova, S. Naydenova Exploratory monitoring for polymer contamination in Black Sea ecosystems and adjacent waters
P-9	<u>N. Stoyanova</u> , M. Ignatova, N. Manolova, I. Rashkov Preparation and antioxidant activity of electrospun fibrous materials from polylactide and Schiff base derivative of Jeffamine ED[®] and 8-hydroxy-quinoline-2-carboxaldehyde and its Cu²⁺ complex
P-10	<u>I. Anastasova</u> , M. Ignatova, I. Rashkov, N. Manolova, A. Georgieva, R. Toshkova Novel antitumor electrospun materials from poly(lactic acid) and derivative of chitosan and 8-hydroxyquinoline
P-11	<u>S. Stoilova</u> , Y. Danov, B. Kostova, P. Petrov Design of poly(N,N-dimethylacrylamide)/β-cyclodextrin nanogels for delivery of Aripiprazole
P-12	<u>G. Kolchakova</u> , I. Tankov, A. Ilieva, Y. Hristov, L. Gonsalvesh Characterization of chitosan from Black Sea shrimp shells
P-13	<u>R. Kalinova</u> , I. Dimitrov Solvent-free synthesis of functional amphiphilic block copolymers for drug delivery applications
P-14	<u>I. Dimitrov</u> , R. Kalinova Multifunctional polycarbonate-based block copolymer: Synthesis and polyion complex nanoparticles formation
P-15	<u>S. Dimova</u> , K. Zaharieva, G. Grancharov, F. Ublekov, M. Shipochka, I. Stambolova, D. Stoyanova Hybrid composites based on PLA/PVP using green synthesized ZnO and their photocatalytic properties
P-16	<u>Ch. Novakov</u> , R. Kalinova, I. Dimitrov, P. Ublekov, S. Veleva, A. Stoyanova Flexible polymer-ionic liquid composites as conductive films for supercapacitor applications
P-17	<u>M. Simeonov</u> , K. Ruseva, D. Nikolova, A. Maestro, C. González, E. Vassileva Poly(2-hydroxyethyl methacrylate)/poly(ethylene glycol diacrylate) copolymer hydrogels – synthesis and characterization
P-18	<u>R. Krushovalieva</u> , Ch. Tzachev An effect of oleic acid in preparation of liposomes
P-19	<u>S. Zahova</u> , I. Tsacheva, K. Troev, V. Mitova Preparation of phosphorus-containing polymer additives based on recycled PET

Symmetric and hybrid supercapacitors with novel poly(ionic liquid) electrolytes

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Due to the intriguing advantages of polymeric materials, they are widely used as electrolytes and binders in supercapacitors, especially for flexible ones. Research efforts to develop new polymeric materials with high mechanical, electrical, chemical and electrochemical properties, as well as their new nanostructures, have made great progress in recent years. The development of Polymeric Ionic Liquids (PILs), having polymer-bearing ionic liquids features in their structure, has attracted a growing interest.

In the present study, multistep synthetic strategy is applied for synthesis of novel pyrrolidinium - containing polymers and their turning into polymeric ionic electrolyte with high conductivity suitable for impregnation of composite electrodes or as additives in PIL electrolytes. The obtained polymers have lower molecular masses than those used so far in the literature, which is a prerequisite for higher conductivity and improvement of the electrochemical performance of the supercapacitor cell. Symmetrical supercapacitors based on these polymer electrolytes and commercial biogenic activated carbon (YP-50F, Kuraray Japan) have been developed, which demonstrate high efficiency and stable capacitance characteristics.

A new hybrid supercapacitor is demonstrated based on introduction of synthesized specific poly(vinylidene fluoride-co-hexafluoropropylene) (P(VDF-co-HFP) copolymer used as binder in its active electrode mass. The cells based on YP-50F, $\alpha\beta$ -Ni(OH)₂ composite electrode, ionic liquid (1-ethyl-3-methylimidazolium tetrafluoroborate) as electrolyte exhibit improved performances. An *ex-situ* physicochemical analysis showed that P(VDF-co-HFP) did not change during the charge-discharge tests.

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Flexible polymer-ionic liquid composites as conductive films for supercapacitor applications

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In recent years, the use of gel polymer electrolytes (GPEs) fabricated by immobilization of ionic liquids (ILs) in suitable host polymers are of growing interest as potential materials for supercapacitor applications due to their various advantageous merits, i.e., non-volatility and non-flammability as well as enhanced mechanical stability due to their plasticizing properties.

In the present study, a few novel GPEs composites are prepared in the form of quasi-solid and flexible films for application in symmetrical capacitor cells. Non-aqueous GPEs have been formulated by immobilization of ILs - 1-ethyl-3-methylimidazolium iodide or 1-butyl-1-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide in a host poly(vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP). Redox-additive GPEs have been also prepared by addition of potassium iodide.

GPEs composites have been thermally, structurally and electrochemically characterized by performing TGA/DSC, FTIR, XRD and electrochemical impedance spectroscopy.

Preliminary cyclic voltammetry (CV) measurements and galvanostatic charge/discharge tests were made to evaluate their applicability in symmetrical supercapacitor cells assembled with commercial activated carbon (YP-50F, "Kuraray Europe" GmbH) electrodes.

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