

Institute of Macromolecular Chemistry,  
Czech Academy of Sciences  
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Czech Republic



• Visegrad Fund



# 8<sup>th</sup> Workshop on Green Chemistry and Nanotechnologies in Polymer Chemistry

6–8 September 2017  
Prague  
Czech Republic

BOOK OF ABSTRACTS AND PROGRAMME

8<sup>th</sup> Workshop **GREEN CHEMISTRY** and **NANOTECHNOLOGIES** in Polymer Chemistry

- 12:05 – 12:25 Oral communication OR-17  
**Isabel P. Fernandes** (*Portugal*)  
 Development of a modified pre-polymer method to produce NMP-free polyurethane-urea aqueous dispersions
- 12:25 – 12:45 Oral communication OR-18  
**Patrycja Maria Jutrzenka Trzebiatowska** (*Poland*)  
 Characterization of cast polyurethanes with high content of recycled polyol
- 12:45 – 13:05 Oral communication OR-19  
**Sylwia Członka** (*Poland*)  
 Natural oils as a chain extenders in the synthesis of rigid polyurethane foams

13:05 – 14:30

*Lunch*

**LECTURE SESSION: Structured hydrogels and hybrid polymers**

*Chaired by: Alessandro Gandini (France)*

- 14:30 – 15:00 Keynote lecture KL-06  
**Miroslava Dušková** (*Czech Republic*)  
 Microstructured pHEMA-hydrogels as sustainable materials for biological studies
- 15:00 – 15:20 Oral communication OR-20  
**Maria Lujan Auad** (*USA*)  
 Interpenetrating hydrogel networks for use in tissue engineering and agricultural applications
- 15:20 – 15:40 Oral communication OR-21  
**Kamol Dey** (*Italy*)  
 Preparation and assessment of high performance gelatin-based hydrogels for tissue engineering
- 15:40 – 16:00 Oral communication OR-22  
**Alexandra Gârea** (*Romania*)  
 Organic-inorganic hybrid polymer: A new organophylization agent for layered silicates
- 16:00 – 16:10 **Closing ceremony**

16:10 – 16:40

*Farewell coffee*

## OR-17

### DEVELOPMENT OF A MODIFIED PRE-POLYMER METHOD TO PRODUCE NMP-FREE POLYURETHANE-UREA AQUEOUS DISPERSIONS

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A modified pre-polymer process was developed for the synthesis of NMP (N-methyl-2-pyrrolidone)-free polyurethane-urea aqueous dispersions. The pre-polymer process is based on the use of dimethylol propionic acid (DMPA, hydrophilizing diol), which requires dissolution in NMP to be introduced in the reactive mixture. NMP is difficult to remove from the dispersion remaining in the final product. In this work we present a modified pre-polymer process composed by four main stages: (1) pre-polymer synthesis in two stages: (i) reaction of the isocyanate with the polyol at 80°C, and (ii) introduction of DMPA pre-neutralized in acetone and proceeding of the reaction at 50°C, (2) Pre-polymer dispersion in water, (3) Chain extension with a diamine; and (4) Co-solvent removal. Several dispersions were synthesized using different DMPA contents (3.0, 4.0, 5.0%, keeping the pre-neutralization degree at 100.0%), and different DMPA pre-neutralization degree (100.0 and 90.0%, using 5.0 % of DMPA). The effect of these variables in the particle size and dispersion stability was evaluated. Based on the obtained results, the modified pre-polymer process is a feasible alternative to obtain NMP-free PUD, thus fulfilling the restrictions imposed by the European Union.

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