

# RENEWABLE BUTYROLACTONE MONOMERS FOR THE PREPARATION OF HYDROGELS AND POLYMERIC NANOPARTICLES

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Polymers derived from nature were synthesized as a promising material with superabsorbent properties.  $\alpha$ -Methylene- $\gamma$ -butyrolactone (MBL) can be derived from tuliposide found in tulips or can be synthesized from biomass sugar-based itaconic anhydride. A similar monomer,  $\gamma$ -methyl- $\alpha$ -methylene- $\gamma$ -butyrolactone (MeMBL) can be synthesized from bio-derived levulinic acid.

In this study, we report on synthesis and properties of new superabsorbent polymers derived from hydrolyzed MBL and MeMBL. Copolymerization of monomers with acrylamide at various ratios in the presence of crosslinker yielded hydrogels with superior degree of swelling and comfortable handling. The effect of chemical composition, the concentration of monomers in water and amounts of crosslinker were investigated. Hydrogels showed equilibrium degree of swelling in the range of 10,000 – 80,000 %. Swelling capacity significantly increased with increased amount of hydrolyzed form of butyrolactone monomers.

MBL and MeMBL were used also as monomers for the preparation of nanoparticles via emulsion polymerization process. The results are presented for the surfactant as well as surfactant-free polymerization of MBL and MeMBL with ionic, water soluble initiator. According to experimental conditions nearly monodisperse polymer particles of 0.15 to 0.60  $\mu\text{m}$  were produced.



Fig. 1. Photo of swollen hydrogel

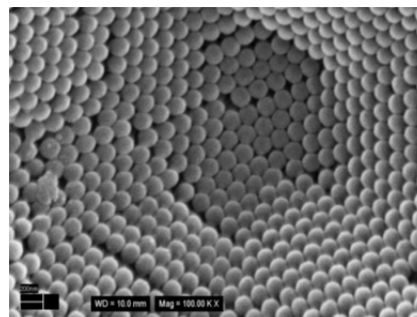


Fig. 2. SEM of PMBL nanoparticles

Acknowledgement: Authors thank for financial support to European Regional Development Fund through project POLYFRIEND, project no. HUSK 1101/1.2.1/0209, APVV grant agency through grant no. APVV-14-0891, APVV-15-0296 and APVV-15-0545