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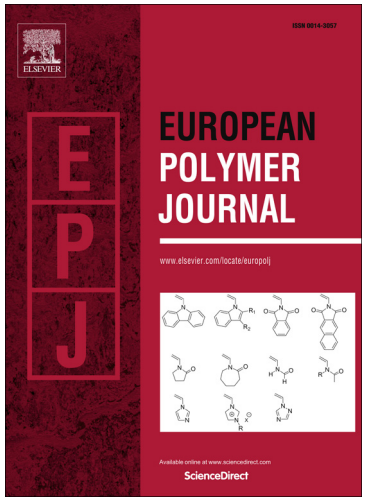

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Tailoring the properties of poly(vinyl alcohol)/poly(vinylpyrrolidone) hydrogels for biomedical applications

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ABSTRACT

Aqueous solutions of poly(vinyl alcohol) (PVA)/poly(vinylpyrrolidone) (PVP) mixtures containing up to 10% PVP were submitted to repeated freezing/thawing cycles in order to prepare physical hydrogels for potential biomedical applications. Porous structure of the PVA/PVP lyophilized samples and their morphology in cross-section and surface were evaluated by scanning electron microscopy and discussed as a function of PVP content. The interactions between polymer chains and the crystallinity of PVA/PVP lyophilized samples were investigated by Fourier transform infrared spectroscopy and wide-angle X-ray diffraction technique, respectively. The addition of PVP determines the decrease of PVA/PVP samples crystallinity. Swelling behavior of the obtained hydrogels was discussed in accordance with their density and porosity. In addition, the effect of the cryogenic treatment and the PVP concentration on the polymer mass loss after swelling test was investigated. The rheological investigations have shown that the freezing-thawing treatment improves the crosslinking degree of PVA/PVP composite hydrogel and increases its ability to resist to deformation and, as a consequence, the dimensional stability is improved. The creep and recovery curves were analyzed for different values of shear stress in order to evaluate the viscoelastic behavior of PVA hydrogels with different content of PVP.

Keywords: Hydrogel, Poly(vinyl alcohol), Poly(vinylpyrrolidone), Creep-recovery, Swelling

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