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BOOK OF ABSTRACTS

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Study on preparation and properties of novel functionalized polyester copolymers based on siloxanes

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Novel functionalized macroporous copolymers were synthesized by reaction of the pendant epoxy groups of poly(glycidyl methacrylate)-*co*-poly(ethylene glycol dimethacrylate)s with 1,3-bis(3-aminopropyl)tetramethyldisiloxane (TMDS) and α,ω-diamino propyl poly(dimethylsiloxane) (PDMS). It was found that the optimal conditions for the synthesis of functionalized copolymers were: reaction temperature of 80 ^{o}C, reaction time of 10 h and a mixture of *N*-methyl-2-pyrrolidone/toluene (1/3 v/v) as the solvent. The effects of the type of siloxanes and concentration of glycidyl methacrylate on the structure and properties of functionalized copolymers were investigated by solid-state ^{13}C and ^{29}Si NMR spectroscopy, FTIR spectroscopy, differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and scanning electron microscopy (SEM). The structure of functionalized copolymers was confirmed by solid-state NMR and FTIR spectroscopy. The DSC results showed that the glass transition temperatures of copolymers were in the range from 63 to 65 ^{o}C and they slightly depend on the copolymer composition exclusively. The thermal stability was better for copolymers functionalized with TMDS in comparison with PDMS based copolymers. Thermal degradation of the synthesized copolymers starts between 276 and 290 ^{o}C. The TG curves of all copolymers display two stages of degradation at 308-368 ^{o}C (stage 1) and 395-430 ^{o}C (stage 2) which are associated with the ester and siloxane bonds. The results indicated that the thermal stability depends on the type of siloxanes and copolymer composition. The surface and cross-section morphology was investigated by SEM and the porous copolymer beads were confirmed by SEM analysis. SEM studies with energy dispersive X-ray mapping revealed that siloxanes migrate to the surface of samples due to their low surface energy. By varying the structure of siloxanes and copolymer composition, functionalized copolymers can be designed and synthesized with diverse physical properties for different purposes.

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