Synthesis and Characterization of Biodegradable Molecularly Imprinted Polymers Based on Poly(lactic acid)

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Biodegradable molecularly imprinted polymers (MIPs) based on poly(lactic acid) (PLA) were prepared and characterized. A biodegradable crosslinker, diacrylated triblock copolymer of PLA-poly(ethylene glycol) (PEG)-PLA was synthesized by ring opening polymerization of D,L-lactide using hydrophilic PEG as a macroinitiator, followed by diacrylation of the end groups for the introduction of polymerizable vinyl groups. The synthesis of acrylate end-capped macromers was characterized using FT-IR and 1H-NMR spectroscopic techniques. These macromers were used to prepare biodegradable crosslinked networks by photopolymerization with methacrylic acid (functional monomer) and theophylline (model template). Evaluation of the various polymers by binding assays indicated that the optimum ratio of template to functional monomer to crosslinker was 1:4:4. Theophylline-imprinted polymer showed higher rebinding capacity than its corresponding non-imprinted polymer (NIP) and also showed selectivity for theophylline over caffeine. In vitro degradation tests of the prepared MIPs were performed in PBS buffer solution at 37℃.