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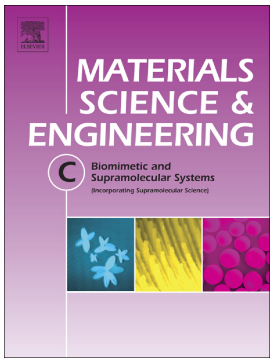

Synthesis and characterization of paclitaxel-imprinted microparticles for controlled release of an anticancer drug

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Synthesis and characterization of paclitaxel-imprinted microparticles for controlled release of an anticancer drug

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Abstract

In this study, novel molecularly imprinted polymer (MIP) microparticles containing methacryl polyhedral oligomeric silsesquioxane (M-POSS) were synthesized through the RAFT precipitation polymerization (RAFTPP) method using paclitaxel (PTX) as the templates. During the course of this investigation, methacrylic acid (MAA) was used as the functional monomer, while ethylene glycol dimethacrylate (EGDMA) was utilized as a cross-linker. The effects of different molar ratios of M-POSS on the microparticles were characterized. The obtained MIP microparticles were confirmed by FT-IR and TGA-DSC. The results of SEM showed regular spherical-shaped MIP microparticles with diameters around 170-490 nm. The PTX loading quantity was closely correlated with the content of M-POSS, and the MIP microparticles showed a satisfactory affinity to PTX with high drug loading (17.1%) and encapsulation efficiency (85.5%). Moreover, these MIP microparticles were sensitive to pH, and consequently the release rates of PTX at pH 5 were much faster than those at pH 7 due to the acid cleavage of the hydrogen bonds. In addition, the results from release experiments of the MIP microparticles showed a very slow and controlled release of PTX, which heralded promising potential as a carrier for PTX delivery in cancer therapy.