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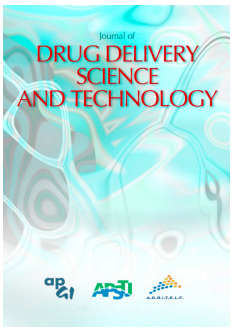

Synthesis and characterization of dual responsive sodium alginate-g-acryloyl phenylalanine-poly n-isopropyl acrylamide smart hydrogels for the controlled release of anticancer drug

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Synthesis and characterization of dual responsive sodium alginate-g-acryloyl phenylalanine-poly n-isopropyl acrylamide smart hydrogels for the controlled release of anticancer drug

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ABSTRACT

The aim of present study is to design the pH and temperature responsive interpenetrating polymer network (IPN) hydrogels for the controlled release of an anticancer drug, imatinib mesylate. In the course of preparation of these hydrogels, first *N*-Acryloyl-L-phenylalanine grafted sodium alginate copolymer (NaAla-g-PAPA) was synthesized through free radical polymerization using ammonium persulfate as an initiator. The grafting parameters % grafting, % grafting efficiency, % conversion, % yield, % homopolymer and rate of grafting (Rg) of the reaction were calculated comparatively. The optimum grafting conditions were obtained by alteration of the reaction conditions such as the reaction time, temperature, monomer and initiator concentrations. Then novel dual responsive smart hydrogels were prepared from the graft copolymer (NaAlg-g-PAPA), N-isopropylacrylamide (NIPAM), acrylamide (AAm) by cross linking with N,N'-methylenebisacrylamide (NN-MBA) through free radical polymerization reaction. The hydrogels were characterized by fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), differential scanning calorimetry (DSC) and scanning electron microscopy (SEM) techniques. Various network parameters of hydrogels such as volume fraction in the swollen state (ϕ), the average molecular weight of the polymer chain between two neighboring crosslinks ($\bar{M}_c$), Flory-Huggins interaction parameter (χ), crosslink density (V_e) and mesh size (ξ) were calculated and explained. Dynamic and equilibrium swelling studies of SAPM hydrgels were performed in distilled