

FACILE ONE-POT SYNTHESIS OF GLUCOSE SENSITIVE BORONIC ACID-FUNCTIONALIZED NANOPARTICLES FOR CAFFEIC ACID RELEASE

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Abstract

In this study, boronic acid-functionalized methacrylate based nanoparticles were synthesized via surfactant-free emulsion polymerization in one pot. Uniform (polydispersity index <0.05) sub-100 nm nanoparticles were obtained. The changes of average hydrodynamic diameter and polydispersity index of nanoparticles against boronic acid content in total monomer and acetone percentage in the solvent mixture were investigated. Polymerization kinetics in terms of monomer conversion rate was monitored by gravimetric method. The nanoparticles were characterized by scanning electron microscopy and dynamic light scattering. The boron content in the nanoparticles was confirmed by electron dispersive X-ray spectroscopy. Further, the nanoparticles were combined with caffeic acid. Caffeic acid carrying nanoparticles were titrated against glucose or fructose in which caffeic acid is released by the displacement reaction in a controlled manner. The displacement of caffeic acid and glucose was monitored by UV-Visible spectral change. Furthermore, in-vitro biocompatibility of nanoparticles were tested in NIH-3T3 cells, which resulted no significant toxicity effect on the cells.

Keywords: Caffeic acid, glucose responsive nanoparticles, drug delivery, smart nanomaterials, surfactant-free emulsion polymerization

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