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Poly(N-Vinylcaprolactam) Based Degradable Microgels for Controlled Drug Delivery

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Abstract : The pH and temperature responsive biodegradable poly(N-vinylcaprolactam) (PVCL) based microgels functionalized with itaconic acid (IA) units are prepared via precipitation polymerization for drug delivery applications. Volume phase transition temperature (VPTT) of the obtained microgels is influenced by both IA content and pH of the surrounding medium. The developed microgels can be degraded under acidic conditions due to the presence of hydrazone based crosslinking points inside the microgel network. The microgel particles are able to effectively encapsulate doxorubicin (DOX) drug and exhibit low drug leakage under physiological conditions. At low pH, rapid DOX release is observed due to the changes in electrostatic interactions along with the degradation of particles. The results of the cytotoxicity assay further display that the DOX-loaded microgel exhibit effective antitumor activity against HeLa cells demonstrating their great potential as drug delivery carriers for cancer therapy.

Keywords : degradable, drug delivery, hydrazone linkages, microgels, responsive
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