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Dual-responsive IPN hydrogel based on sugarcane bagasse cellulose as drug carrierYuanfeng Pan ^{a,*}, Jingchun Wang ^a, Pingxiong Cai ^b, Huining Xiao ^c

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Abstract:

In this work, the stepwise synthesis of interpenetrating polymer network (IPN) strategy was developed in an attempt to fabricate novel hydrogels consisting of sugarcane bagasse cellulose (SBC), carboxymethylcellulose (CMC) and poly (N-isopropylacrylamide) (PNIPAm) as a dual-responsive drug carrier. The pretreated and dissolved SBC was pre-crosslinked using epichlorohydrin in the presence of CMC, followed by in-situ free-radical polymerization of NIPAm in the presence of N,N'-Methylene-bis(acrylamide) as a crosslinking agent. The carboxyl groups in CMC and PNIPAm chains rendered the resulting hydrogel pH and thermal responsive. The results from scanning electron microscopy, infrared spectroscopy, thermogravimetric analysis and mechanical property testing demonstrated the successful formation of the IPN with proper structure and mechanical strength. The swelling experiments at different temperatures and pH showed the dual-sensibility of the hydrogels. Moreover, bovine serum albumin (BSA) was used as a model drug and loaded in the hydrogel; and the drug release behavior was revealed in phosphate buffer solution (PBS) and simulated gastric fluid (SGF). The results indicated that the dual-responsive IPN hydrogel is of great potential for the controlled release of drug.

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