Synopsis of Original Research Paper

Development of Smart Hydrogels from Amino-Acid-based Polymers

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Fabricating robust shape-fix/memory hydrogels that respond to external stimuli is an important challenge in facilitating gel technology for versatile applications. In this study, we constructed novel multi-stimuli-controllable shape memory hydrogel systems from amino acid-derived vinyl polymer networks. Amino acid-derived vinyl polymers are attractive thermo-responsive materials that are easily synthesized from renewable bio-sources and are biocompatible. Upper critical solution temperature-type poly (*N*-acryloyl glycinamide) (PNAGAm) is selected in this study, as it exhibits good biocompatibility, non-toxicity to cells, and strong and reversible hydrogen bonding. By introducing cystine-derived disulfide bonds into the PNAGAm matrix, Au-nanorod could be conjugated stably into the hydrogel, resulting in a temperature/light dual-responsive shape memory hydrogel. Furthermore, temperature/pH-dual responsive hydrogel was successfully fabricated by radical copolymerization of NAGAm with *N*-acryloyl aspartic acid (NAD). The hydrogel properties, including stimuli-responsive, mechanical, and shape fix/memory behaviors, were comprehensively investigated. Integrating multiple smart functions into a single hydrogel can meet the requirements for various industrial, biomedical, and cosmetic applications.