pH dependent swelling behavior of poly(2-hydroxyethyl methacrylate)-based copolymer hydrogels

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A hydrogel is highly hydrated polymer networks which can be used as a sensor based on its different swelling behavior by external stimuli. We present experimental result for control of swelling behavior of copolymer based on pHEMA having different pH dependency. The pHEMA hydrogel itself has little pH dependency. However, when the pHEMA is copolymerized with acrylic acid, the swelling ratios of the resulting copolymer shows positive dependence on pH. When the pHEMA is copolymerized with 2-(Dimethylamino)ethylmethacrylate (DMA), the copolymer shows higher swelling ratio at lower pH. Thus, the pH-dependent swelling behavior of the pHEMA based hydrogel can be controlled by choosing appropriate functional groups. Also, we further optimized the composition of the copolymer hydrogel, by investigating the effect of the initiator and crosslinker contents on the swelling ratio. Information presented here would be helpful to realize sensors or actuators working based on stimuli-responsive hydrogels.