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Smart Nanoscale Hydrogels Based on Natural Polymers[1] SAHIL SANDESH GANDHI, HUAN YAN, CHANJOONG KIM, Liquid Crystal Institute, Kent State University, Kent, OH 44242 — Smart polymeric nanoscale hydrogels have gained considerable attention due to their unique properties tailored from the combination of stimuli-responsiveness and nanoscale size in a single material system. Such nanogel systems hold great potential for use in biomedical applications such as controlled drug release, tissue engineering, biosensors, etc. We present a novel tunable thermoresponsive gelatin nanogel that exhibits a volume reduction of more than 30× at 32°C due to the helix to random coil transition of gelatin chains confined in the nanogels. This novel helix-melting mechanism is markedly different from the reversible random coil to globule transition that occurs at the lower critical solution temperature (LCST) in popular thermosensitive polymers like pNIPAM. Using dynamic light scattering, transmission electron microscopy, and polarimetry, we study how temperature changes affect the particle size and the molecular configuration of smart gelatin nanogels and determine key factors influencing the thermoresponsive properties. The thermosensitive properties of these nanogels can be exploited in the development of new types of stimuli-responsive, biomedically relevant materials based on natural polymers.

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