

Novel Polymer Gel Nanoparticle Dispersions

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Monodisperse colloidal systems have been used as models for the study of phase transitions and as templates for the fabrication of photonic crystals. It has been found that poly-N-isopropylacrylamide (PNIPAM) gel nanoparticles can self-assemble into a crystalline array in water. This talk will review some recent progresses in this area including synthesizing monodispersed nanoparticles with functional groups attached, characterizing phase diagrams. Specifically, a novel aqueous solution of polymer gel nanoparticles will be discussed. This dispersion can form a physically bonded nanoparticle network above a gelation temperature. That is, it is a fluid at room temperature but becomes a solid above about 33 °C. The polymer gel nanoparticles consist of polymer interpenetrating networks of PNIPAM and polyacrylic acid (PAAc). The PNIPAM provides physical bonds between particles via a temperature-dependent interparticle potential, while PAAc in the neutral pH provides ionic charges that are temperature-independent and prevent the collapse of the particles into an aggregate.