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Thermo-responsive hybrid microgel particles with gold nanorods

Aslam Khan
King Saud University, Saudi Arabia

Microgels are intramolecularly cross-linked polymer particles of colloidal size that swell and deswell in a good solvent in response to external stimuli. Depending on the composition, they can be sensitive to external conditions such as temperature, pH, magnetic field, light, osmotic strength, and solvent composition; with temperature being considerably investigated because it represents an effective stimulus in many applications. I will be talking about thermoresponsive hybrid materials based on the assembly of gold nanorods, Au NRs, into the multi-responsive, cross-linked copolymer microgel particles. These microgel particles were prepared by the surfactant-free emulsion polymerization of N-isopropylacrylamide and acrylic acid with N,N'-methylene bis-acrylamide as a cross-linker, which provides particles sized approximately 160 nm that are interconnected with one other. CTAB-stabilized Au NRs were also prepared independently using a seed-mediated growth method and then loaded into swollen, deprotonated, acrylic acid-containing microgel particles using the electrostatic interactions between the oppositely charged particles. Transmission electron micrograph of the as-prepared hybrid Au NRs-microgel particles confirmed that the Au NRs were attached to the surface of the microgel particles. The size-dependent temperature-responsive characteristics of the hybrid microgel particles were studied by dynamic light scattering, and it was found that as the temperature increased across the phase transition temperature, the particle size decreased to 56 % of the original volume. The thermo- and pH-responsive optical properties of the hybrid microgel particles were also systematically investigated.

aslamkhan@ksu.edu.sa