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Abstract

Amphiphilic cellulose-based microgels with a reversible volume-phase transition at around 40.5°C—the low critical solution temperature (LCST)—have been synthesized, characterized, and optimized. After carefully planned synthesis and filtering the samples with a 0.22μm filter microgels were characterized with dynamic light scattering (DLS), yielding reproducible results for the radii of particles around 100-120 nm below the LCST and 60-70 nm above it. Through the use of scanning electron microscopy (SEM), air dried samples and wet samples were also analyzed. Air dried samples were dried for 24 hours until all water was evaporated, ensuring the collapse of microgels as if they were expelling water above the transition. It was discovered that air dried microgels at room temperature had radii of 60-70 nm identical to radii determined from DLS above the LCST. Wet samples were imaged in home- made wet cells that contained in a silicon nitride window and sealed with epoxy glue to examine microgels in natural state of droplets in solution. The wet samples at room temperature revealed microgel radii larger than radii observed via DLS, indicating a need to look further into the SEM wet sample method both below and above the transition.