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Viscoelasticity and Fluorescence of polymer-based magnetically switchable soft composite

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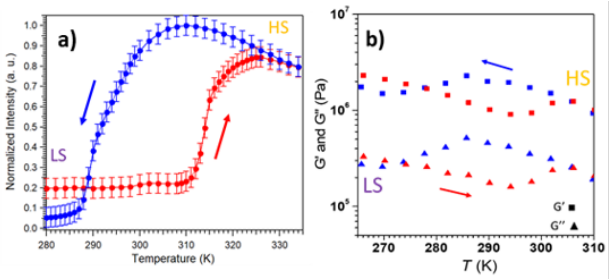
Switchable materials comprise an actual and eclectic area of research as well fundamental as applied research uestions. While the integration of magnetic nano- and microparticles into soft matrices enables magnetically responsive composites, the integration of particles that fundamentally change their nature under the influence of external fields remains a key challenge. One option to achieve this goal is the employment of nanoparticles composed of a spin-crossover Fe(II) complex in a polymer matrix,1 as they can undergo an abrupt transition from a diamagnetic state (low spin electronic configuration) to a paramagnetic state (high spin configuration) with temperature. Despite their potential, the study of the viscoelastic properties of spin crossover soft nanocomposites remains relatively unexplored.[2]
In this work, the viscoelastic, fluorescent, and spin crossover properties of composite gels are studied. The composites are prepared by dispersing Fe(II)-triazole based rod-shaped particles of various particle lengths in NaPSS aqueous solutions. The resulting Fe(Htrz)2(trz)(BF4)/NaPSS composite systems exhibit critical gel behaviour,[3] driven by percolation of the particles within the NaPSS matrix, similar to phenomena previously observed in similar anisometric particle dispersions.4 However, due to their high LS-to-HS transition temperature (T1/2 ≈ 113℃), studies on these composites are limited to the LS state., In contrast, composites based on on the parent complex Fe(NH2trz)3Cl2 display a broad thermal hysteresis loop centered near room temperature, enabling the simultaneous investigation of viscoelastic and fluorescent responses in both spin state (HS and LS) under ambient conditions (see Figure).



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