

Stimuli-responsive shape shifting co-assemblies of rod-block copolymers with functional nanoparticles

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Precise, reversible control over polymer self-assembly is central to the design of next-generation functional biomaterials. While temperature-responsive self-assembly has been widely studied, reliance on uniform heating limits spatial and temporal resolution. In this work, we explore a light-triggered strategy for driving morphological transitions in rod-like polymer assemblies using embedded plasmonic gold nanoparticles. We show that while nonsolvent-induced assembly results in ellipsoidal micelles, the incorporation of AuNPs enables light and heat triggered transitions to curved and ring-like morphologies. The observed morphologies and their transitions also depend on assembly conditions, such as the rate of solvent exchange, indicating a role for non-equilibrium pathways in the final structure. These findings provide a framework for understanding how rod–nanoparticle interactions can be harnessed to achieve controlled, stimuli-responsive self-assembly. The implications of this work for programmable nanostructures, light-actuated hydrogels, and spatially controlled soft material systems will be discussed.

Friday, August 29, 2025

10:45 AM (UTC-05:00) Eastern Time (US & Canada) | Hybrid format, remote presentation

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