PNIPAM and PS Particle Interaction Heated by Scanning Infrared Laser

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Abstract

The interaction between particles in a polymer solvent usually causes interesting and complex phenomenon. In this research, we report on the reaction of polystyrene (PS) particles and polymers that perform phase transition under laser heating. Using the poly(N-isopropylacrylamide) (PNIPAM) sample, we successfully observe the aggregation of particles which is generated by the coil-globule transition of PNIPAM after locally scanned by laser. Finally we investigate the dependence of different factors on the size of the circular zone. We show that higher intensity of laser and large scanning area may facilitate the aggregation of particles. However, changing sizes of PS particles show no difference in deceleration or relaxation time. Such laser scanning system and fluorscence particles reveal dynamic interactions during phase transition of polymers, providing messages about the underlying mechanisms of interactions.

For the first three figures, PS particles are trapped by PNIPAM when laser heating (scanning in circle) was gradually added. After shutting down the laser sauce, PS particle are released and diffuse from the ring.

A simple cartoon figure to describe the process of particle aggregation to diffusion under polymer phase transition.