

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Designing a gel–fiber composite to extract nanoparticles from solution** YA LIU, University of Pittsburgh, OLGA KUKSENOK, Clemson University, ANNA BALAZS, University of Pittsburgh — Using DPD simulations, we proposed the design of a gel–fiber coating where the components of the system act in concert to extract particles from solution and localize these solids in the underlying gel layer. We model an array of flexible fibers that are embedded in a lower critical solution temperature (LCST) thermo-responsive gel, which swells at lower temperatures and collapses at higher temperatures. The system is immersed in a solution containing dispersed nanoparticles and this fluid is driven to flow by an imposed shear. When the gel is heated, it collapses to expose the fibers, and thereby, triggers the “catch” process. Namely, the fibers can act like “arms” that wrap around the nanoparticle and bring it from the outer solvent into the gel layer. Moreover, we show that depending on the flexibility and hydrophobicity of the fibers, as well as the imposed shear, we can position the nanoparticles at the desired height within the gel layer. Our approach can be utilized for the detection and separation of components in fluids and for the controlled insertion of nanoparticles within a hydrogel at a particular distance from the gel interface

Ya Liu  
University of Pittsburgh

Date submitted: 06 Nov 2015

Electronic form version 1.4