

Abstract Submitted
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Design of Catch-and-release System by Utilizing Thermo-responsive Gel-Hairpin Composites. YA LIU, University of Pittsburgh, OLGA KUKSENOK, clemson university, XIMIN HE, Arizona State University , ANNA BALAZS, University of Pittsburgh — Inspired by properties of aptamers that can bind (unbind) to target proteins in their specific hairpin (chain) conformation dependent on external temperature, we use computational modeling to design an effective catch-and-release device by attaching an array of thermo-responsive hairpins to the lower critical solution temperature (LCST) thermo-responsive gels. With an increase in temperature, the polymer network swells and the hairpins can catch the target nanoparticles in the upper mixture fluid. As the temperature decreases, the polymer network collapses and the hairpins unfold to a chain conformation, releasing the arrested particles into the lower fluid for collection. We pinpoint the optimal values for obtaining the robust structural changes of the hairpins and explore the effects of the shear flow on the catch-and-release process. Our approach can be utilized for the detection, separation, and sorting of the components within the multi-component mixtures.

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