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Harnessing Active Fins to Segregate Nanoparticles from Binary Mixtures YA LIU, OLGA KUKSENOK, University of Pittsburgh, AMITABH BHATTACHARYA, Indian Institute of Technology Bombay, YONGTING MA, Virginia Commonwealth University, XIMIN HE, JOANNA AIZENBERG, Harvard University, ANNA BALAZS, University of Pittsburgh — One of the challenges in creating high-performance polymeric nanocomposites for optoelectronic applications, such as bilayer solar cells, is establishing effective and facile routes for controlling the properties of interface and segregation of binary particles with hole conductor particles and electron conductor particles. We model nanocomposites that encompass binary particles and binary blends in a microchannel. An array of oscillating microfins is immersed in the fluid and tethered to the floor of the microchannel; the fluid containing mixture of nanoparticles is driven along the channel by an imposed pressure gradient. During the oscillations, the fins with the specific chemical wetting reach the upper fluid when they are upright and are entirely within the lower stream when they are tilted. We introduce specific interaction between the fins and particulates in the solution. Fins can selectively "catch" target nanoparticles within the upper fluid stream and then release them into the lower stream. We focus on different modes of fins motion to optimize selective segregation of particles within binary mixture. Our approach provides an effective means of tailoring the properties and ultimate performance of the composites.

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