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Selective trapping nanoparticles on an adaptive, topographic surface SHU YANG, YING ZHANG, SHUHUI QIN, Materials Sci. and Eng., Univ. of Pennsylvania, JOHN A. TAYLOR, JOANNA AIZENBERG, Bell Labs, Lucent Technologies — Control of interfacial properties, such as wettability, adhesion, and friction, is of great importance for both fundamental science and practical applications. One of the major challenges is how to spatially control the molecular recognition in different regions of surface and interface. Here, we report selective trapping and repelling of particles at different locations of a topographic substrate. It is achieved by tuning surface from highly hydrophobic to superhydrophilic within a narrow temperature window (= sim10°C). A thin layer ($\sim$ 10 nm) of thermoresponsive polymer brushes from poly(N-isopropylacrylamide) (PNIPA) were "grafted from" the tips or everywhere on the micropost arrays (1 micron in diameter, 10 micron tall and 1 micron pitch), using surface- initiated atom transfer radical polymerization (ATRP). PNIPA has a lower critical solution temperature (LCST) of 32°C in water and becomes increasingly hydrophobic when heated from room temperature to 40°C. Above 40°C, the surface is highly hydrophobic (contact angle of 120-135 degree) on the microposts, which repels the hydrophilic silica particles. At room temperature, the surface becomes superhydrophilic (contact angle $<$ 10 degrees). The silica particles are found selectively trapped either on the tips, the bottom, or homogeneously along the microposts, depending on the particle size (900 nm vs. 90 nm), type of brushes (single vs. binary brushes), and the grafting location of PNIPA.

Shu Yang
University of Pennsylvania

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