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The impact of surface properties on particle-interface interactions ANNA WANG, Harvard University, School of Engineering and Applied Sciences, DAVID KAZ, University of California, Berkeley, RYAN MCGORTY, University of California, San Francisco, VINOTHAN N. MANOHARAN, Harvard University, School of Engineering and Applied Sciences and Department of Physics — The propensity for particles to bind to oil-water interfaces was first noted by Ramsden and Pickering over a century ago, and has been attributed to the huge reduction in surface energy when a particle breaches an oil-water interface and straddles it at its equilibrium height. Since then materials on a variety of length scales have been fabricated using particles at interfaces, from Pickering emulsions to Janus particles. In these applications, it is simply assumed that the particle sits at its hugely energetically favourable equilibrium position. However, it was recently shown that the relaxation of particles towards their equilibrium position is logarithmic in time and could take months, much longer than typical experiments. Here we investigate how surface charge and particle 'hairiness' impact the interaction between micronsized particles and oil-water interfaces, and explore a molecular kinetic theory model to help understand these results. We use digital holographic microscopy to track micron-sized particles as they approach an oil-water interface with a resolution of 2 nm in all three dimensions at up to thousands of frames per second.

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