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Using Lipid Vesicles to Achieve Selective Removal or Deposition of Janus Particles on Rough Surfaces EMILY CRABB, NICHOLAS MOELLERS, XIN YONG, ISAAC SALIB, ANNA BALAZS, Chemical Engineering Dept., University of Pittsburgh — Using dissipative particle dynamics (DPD), we explore the interaction between a nanoscopic lipid vesicle and Janus nanoparticles that are localized on rough hydrophilic substrates. We have previously shown that a fluid-driven vesicle can adsorb and transport up to four nanoparticles on a flat hydrophilic surface. Furthermore, we showed that it is possible to induce pick-up and drop-off of particles by varying parameters such as particle composition and particle-substrate attraction. We now introduce a nano-scale crack that spans the substrate's width onto the otherwise flat surface and determine under what conditions the vesicle either removes the particles from or deposits the particles into this trench. We then use these results to perform particle sorting by having the vesicle only pick up or drop off particles with certain compositions. The ability to selectively pick up and deliver nanoparticles could allow for more efficient cleaning and repair of a surface, as the particles compositions could be chosen so that the vesicle can remove the unwanted particles from the damaged areas and deposit other particles that are needed for recovery.

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