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Microfluidic Controlled Conformal Coating of Particles SCOTT TSAI, School of Engineering and Applied Sciences, Harvard University, JASON WEXLER, JIANDI WAN, HOWARD STONE, Department of Mechanical and Aerospace Engineering, Princeton University — Coating flows are an important class of fluid mechanics problems. Typically a substrate is coated with a moving continuous film, but it is also possible to consider coating of discrete objects. In particular, in applications involving coating of particles that are useful in drug delivery, the coatings act as drug-carrying vehicles, while in cell therapy a thin polymeric coating is required to protect the cells from the host's immune system. Although many functional capabilities have been developed for lab-on-a-chip devices, a technique for coating has not been demonstrated. We present a microfluidic platform developed to coat micron-size spheres with a thin aqueous layer by magnetically pulling the particles from the aqueous phase to the non-aqueous phase in a co-flow. Coating thickness can be adjusted by the average fluid speed and the number of beads encapsulated inside a single coat is tuned by the ratio of magnetic to interfacial forces acting on the beads.

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