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Measuring the Size and Slip Lengths of Individual Nanoparticles using Suspended Microchannel Resonators JESSE COLLIS, JOHN SADER, The University of Melbourne, SELIM OLCUM, SCOTT MANALIS, Massachusetts Institute of Technology — Characterizing nanometer-scale particles immersed in liquids using cantilever-based sensing methods can be challenging due to large hydrodynamic damping forces. Suspended Microchannel Resonators (SMRs) differ to conventional cantilever sensors by embedding a microfluidic channel within a vacuum-encased cantilever. These devices can be used as sensitive mass balances for individual nanoparticles flowing through the microfluidic channel; resolution at the attogram scale has been demonstrated recently. We explore a new modality for these devices, where the particle size and surface properties can be characterized. The theoretical framework for this modality is developed using both asymptotic and numerical methods, for which excellent agreement is observed. Comparison of experimental data with Monte-Carlo simulations shows we are able to accurately quantify the slip lengths of these particles.

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