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Anti-Brownian ELectrokinetic (ABEL) Trapping of Single High Density Lipoprotein (HDL) Particles[1] SAMUEL BOCKENHAUER, Department of Physics, Stanford University, ALEXANDRE FURSTENBERG, QUAN WANG, BRIAN DEVREE, XIAO JIE YAO, MICHAEL BOKOCH, BRIAN KOBILKA, Department of Molecular and Cellular Physiology, Stanford University, ROGER SUNAHARA, University of Michigan Medical School, W. E. MOERNER, Department of Chemistry, Stanford University — The ABEL trap is a novel device for trapping single biomolecules in solution for extended observation. The trap estimates the position of a fluorescently-labeled object as small as ∼10 nm in solution and then applies a feedback electrokinetic drift every 20 us to trap the object by canceling its Brownian motion. We use the ABEL trap to study HDL particles at the single-copy level. HDL particles, essential in regulation of "good" cholesterol in humans, comprise a small (∼10 nm) lipid bilayer disc bounded by a belt of apolipoproteins. By engineering HDL particles with single fluorescent donor/acceptor probes and varying lipid compositions, we are working to study lipid diffusion on small length scales. We also use HDL particles as hosts for single transmembrane receptors, which should enable study of receptor conformational dynamics on long timescales.

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