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Atomic Force Controlled Capillary Electrophoresis AARON LEWIS, TALIA YESHUA, MILA PALCHAN, YULIA LOVSKY, Hebrew University of Jerusalem, HESHAM TAHA, Nanonics Imaging Ltd. — Lithography based on scanning probe microscopic techniques has considerable potential for accurate & localized deposition of material on the nanometer scale. Controlled deposition of metallic features with high purity and spatial accuracy is of great interest for circuit edit applications in the semiconductor industry, for plasmonics & nanophotonics and for basic research in surface enhanced Raman scattering & nanobiophysics. Within the context of metal deposition we will review the development of fountain pen nanochemistry and its most recent emulation Atomic Force Controlled Capillary Electrophoresis (ACCE). Using this latter development we will demonstrate achievement of unprecedented control of nanoparticle deposition using a three-electrode geometry. Three electrodes are attached: one on the outside of a metal coated glass probe, one on the inside of a hollow probe in a solution containing Au nanoparticles in the capillary, and a third on the surface where the writing takes place. The three electrodes provide electrical pulses for accurate control of deposition and retraction of the liquid from the surface overcoming the lack of control seen in both dip pen lithography & fountain pen nanochemistry when the tip contacts the surface. With this development, we demonstrate depositing a single 1.3 nm Au nanoparticle onto surfaces such as semiconductors.

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