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Nanoscale Electron-Beam-Induced Deposition from Bulk Liquid Precursors EUGENII U. DONEV, J. TODD HASTINGS, Dept of Electrical and Computer Engineering, University of Kentucky, Lexington, KY 40506, USA — We present a novel technique for direct-write patterning of nanostructures: LP-EBID, liquid-precursor electron-beam-induced deposition. We have deposited metal nanostructures from bulk aqueous solutions of platinum (Pt) and gold (Au) precursors. While traditional EBID processes using gas-phase precursors produce highly contaminated metal deposits (e.g., only 25–40 at.% Pt content), we show that LP-EBID yields high-purity deposits (∼90 at.% Pt) at rates more than ten times higher than those of gas-phase EBID. We have also investigated how the lateral size of Pt nanoparticles varies with charge dose, and how the already deposited particles are affected by the subsequent deposition of their neighbors (i.e., proximity effects). Furthermore, we demonstrate that LP-EBID can produce dense arrays (60 nm pitch) of Pt nanodots and nanowires (25 nm diameter or width), which compare favorably with the typical resolution of resist-based e-beam lithography.

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