

Abstract Submitted
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Sub-10 nm Device Fabrication in a High-Resolution Transmission Electron Microscope MICHAEL FISCHBEIN, MARIJA DRNDIC, University of Pennsylvania, Department of Physics and Astronomy — Materials are known to be susceptible to electron-irradiation induced damage during their imaging in a TEM. Though these effects are typically undesirable, we show here that electron-irradiation by the imaging beam of a HRTEM can be used to controllably sculpt metal with single-nanometer precision, thereby enabling device fabrication at a size scale that traditional fabrication methods cannot access. We have used this technique to fabricate metal structures with sub-10 nm features on silicon nitride membrane substrates. Examples include arbitrarily curved nanowires, nanometer-wide channels and nanorings. It will be shown that these ultra-small structures can be integrated into large-scale circuitry, without contact resistance. Potential applications of this technique include nanoelectronics, nanofluidics and the study of size effects on superconductivity. This work was supported by ONR Young Investigator Award (N000140410489), NSF Career Grant (DMR-0449553), NSF NSEC Grant (DMR-0425780), and NSF-IGERT (DGE-022166).

Michael Fischbein
University of Pennsylvania

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