

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

New Devices for Integrating Controlled Assembly, Imaging and Transport Measurements of Nanoscale Structures MICHAEL FISCHBEIN, MARIJA DRNDIC, Department of Physics and Astronomy, University of Pennsylvania — Experiments on charge transport in nanostructures require knowledge and control of the structural details in order to achieve an improved understanding of the transport mechanisms. Typical devices used to probe the electrical properties of nanometer scale objects do not allow for fluorescence imaging or the Angstrom resolution imaging that is available with Transmission Electron Microscopy. A substantial limitation on the knowledge of the sample's content and configuration is thus imposed. Furthermore, uncontrolled sample arrangement in these devices can introduce extraneous channels for transport. We have fabricated a new kind of device which resolves these issues. Silicon Nitride wafers are modified in a multi-step lithography process to yield a device which allows transmission based imaging of nanostructures positioned inside a submicron electrode gap. Additional lithographic steps make it possible to direct the assembly of the nanostructures. We discuss specific examples involving nanocrystals. This fabrication process allows for a range of device geometries which offer solutions to critical issues that are encountered when performing transport measurements on nanostructures. * This work is supported at Penn by the ONR Young Investigator Award # N000140410489, the American Chemical Society and the startup funds at Penn. MF acknowledges funding from the NSF IGERT Program.

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Date submitted: 01 Dec 2004

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