Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Controlled fabrication of DNA molecular templates for the deposition and electrical measurement of 1D metal nanowires JORGE BARREDA, LONGQIAN HU, LIUQI YU, ZHIBIN WANG, JUNFEI XIA, JINGJIAO GUAN, PENG XIONG, Florida State Univeristy, GUAN'S GROUP TEAM, XIONG'S GROUP TEAM — Stretched DNA nanowires (NWs) offer a convenient substrate for the fabrication and measurement of 1D metal NWs of width down to nm [1].So far the fabrication of the DNA templates has replied on somewhat random self-assembly processes. Here we demonstrate a process with high degree of control over the length, spacing, diameter , and orientation of the metal NWs: A one-step dewetting of a DNA solution on a PDMS stamp with an array of micropillars with well-defined pitch yields DNA NWs suspended across the micropillars along a chosen direction [2]. The DNA NWs are then transferred via micro-contact printing onto a Si/SiO2/SiNx substrate with a lithographically fabricated trench defined by an opening in the SiNx layer and undercut in the SiO2 layer. The template with DNA NWs stretched across the trench is placed in a high-vacuum evaporator for metal deposition, resulting in a metal NW of width defined by the diameter of the DNA template (<10 nm) and length determined by the width of the trench. Quasi-four terminal I-V measurements are performed in situ with incremental metal deposition. Concomitant with a transition from strongly nonlinear IV to Ohmic behavior with increasing thickness, the NW resistance is observed to decrease exponentially. [1] Hopkins, David S., et al. Science 308.5729 (2005): 1762-1765. [2] Guan, Jingjiao, et al. Soft Matter 3.11 (2007): 1369-1371.

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Date submitted: 05 Nov 2015 Electronic form version 1.4