Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Voltage-controlled non-linear characteristics of interdigitated MIM devices BONNIE LUDWIG[1], Dow Corning Corporation, ALEX HEGYI, Stanford University, CHRISTOPHER KELLY, DAMIAN KHAN, MARK BANASZAK HOLL, BRADFORD ORR, University of Michigan — Self-assembly was key to creating the first metal-molecule-metal (M-mol-M) junctions in Au-$(HSiO_{1.5})_n$-Au devices. Metal-insulator-metal (MIM) junctions are simple thin-film devices that, after application of an electroforming pulse, self-assemble into a system of conductive critical links. Electroforming causes the voltage-controlled response of the device to change from ohmic behavior to an unusual combination of nonlinearities including negative differential resistance (NDR), multiple rewriteable resistance states, and random telegraph signal (RTS) noise. The specific physical or chemical changes that cause these effects are unknown. Certain Au-$(HSiO_{1.5})_n$-Au devices have voltage-controlled behavior that is indicative of a reduced number of critical links. A comparison of the electronic behavior of MIM devices on two different size scales will be presented that provides further insight into the nature of individual critical links in these devices.

[1]This work was done at the University of Michigan in fulfillment of B. Ludwig's PhD requirements.

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Date submitted: 21 Nov 2006 Electronic form version 1.4