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Electrical Characterization of Critical Phase Change Conditions in Nanoscale $Ge_2Sb_2Te_5$ Pillars OZHAN OZATAY, BARRY STIPE, JORDAN KATINE, BRUCE TERRIS, Hitachi Global Storage Technologies, San Jose Research Center, San Jose, CA 95135 — Following the original work of Ovshinsky on disordered semiconductors that exhibit ovonic threshold switching (OTS) there has been substantial interest in the electronic reversible switching properties of chalcogenides[1]. The current induced phase transitions between polycrystalline and amorphous states in these materials offer orders of magnitude changes in the conductance which makes them an ideal candidate for non-volatile data storage applications. In this work we investigate the scaling of critical programming conditions required to observe such transitions between highly resistive (disordered) and highly conductive (ordered) states by constructing a resistance map with various pulse widths and amplitudes under different cooling conditions (as a function of pulse trailing edge). We study the evolution of critical phase change conditions as a function of contact size (50nm-1μm) and shape (circle-square-rectangle). We compare the resulting switching behaviour with the predictions of a finite-element model of the electro-thermal physics to analyze the nature of the switching dynamics at the nanoscale. [1] S-H. Lee, Y. Jung, R. Agarwal, *Nature Nanotechnology*; doi:10:1038/nnano.2007.291

Ozhan Ozatay
Hitachi Global Storage Technologies,
San Jose Research Center, San Jose, CA 95135

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