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Sheet resistance measurements on a Fe-doped NiO ReRAM Test Chip. JAMES SHOOK, YUBO CUI, MD ABDUL AHAD TALUDKER, TANG XI, GREG MCCLENDON, ALEX ZAKHIDOV, LUISA SCOLFARO, WILHELMUS GEERTS, Department of Physics, Texas State University, San Marcos, TX78666 — Transition metal oxide, specifically NiO, shows promise in its potential application in Resistive Random Access Memory (ReRAM) devices. In ReRam the resistance of a thin oxide layer is reversible switched via soft breakdown between a low and high resistance state. We investigated the sheet resistance of Fe doped NiO test structures. The ReRAM device wafer consisted of a50 nm thick Ni0.9Fe0.1-oxide film sandwiched between a bottom (20 nm Ti/150 nm Co) and top electrode (2 nm Ti/78nm Co). All devices were made by RF sputtering using an AJA system. 2pp and 4pp resistance measurements were made using an HP4145A semiconductor parameter analyzer (SPA) connected to a wafer prober. The measured sheet resistances were: 1.02E9+/-0.20E9 Ohm/square for the oxide, 11.3+/-1.51 Ohm/square for the bottom electrode, and 51 Ohm/square for the top electrode. Of particular interest is the behavior of the PyO test structures under probing by the SPA in 4pp mode using current sourcing. Initial attempts to obtain resistance resulted in non-linear measurements of Voltage against current. Upon introducing a hold and delay time to the measurements, linearity of voltage versus current emerged suggesting that the oxide test structures displays characteristics of a capacitance device. We acknowledge financial support from Texas State University (Research Enhancement grant) and from DOD (HBCU/MI grant W911NF-15-1-0394).

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