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Imaging the Electric Breakdown in V2O3 at the Nanoscale

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We have measured the electric properties of a 200 micron wide and 10 micron long bridge in a 100 nm thick V2O3 thin film at the metal-insulator transition. Discontinuous jumps to lower voltages in the current voltage characteristic (IV) followed by a more or less constant voltage progression of the curve for high currents indicate an electric breakdown of the device. In addition, the IV curve shows hysteresis and a training effect, i.e. the succeeding IV loops are different from the first IV loop of the thermal cycled device. Low temperature scanning electron microscopy indicates that the electric breakdown is caused by a combination of several mechanism like self-heating as well as percolative and bolt-like switching.

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