

## **Oxidation-Resistant Amorphous TaN Barrier for MIM-Ta<sub>2</sub>O<sub>5</sub> Capacitors in Giga-Bit DRAMs**

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We demonstrate that an amorphous TaN with no grain boundaries reveals a good oxidation-resistant performance after annealing the Ta<sub>2</sub>O<sub>5</sub> dielectric (550°C, O<sub>2</sub>). We fabricated an MIM-TaO capacitor with a concave-type Ru SN on the TaN barrier metal. This showed a contact resistivity of 0.27 kΩ•μm<sup>2</sup>, a capacitance of 20 fF/bit, and a leakage current of 0.9 fA/bit (–1 to 1 V). We further fabricated a crown-type Ru SN to demonstrate scalability to 0.10-μm design rule.