Supporting Information

Interfacial oxygen-scavenging-driven formation of atomic-layer-deposited MoO_2 on MoN_x electrodes for improved TiO_2 capacitor performance

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KEYWORDS: MoO_2; Atomic Layer Deposition; Oxygen-scavenging; TiO_2; DRAM capacitor

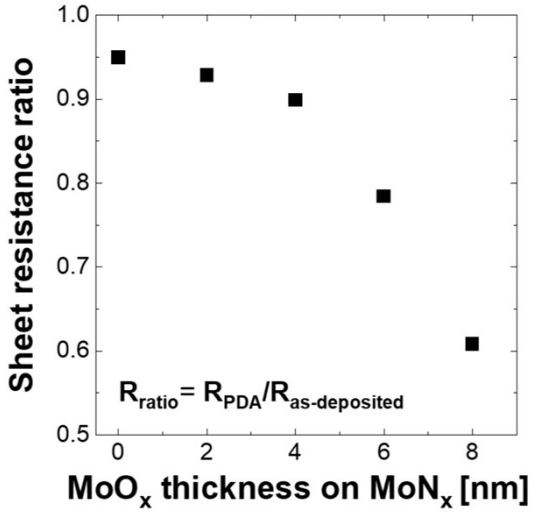

Figure S1. Sheet resistance ratio of the MoO_x/MoN_x stack before and after PDA as a function of MoO_x thickness.

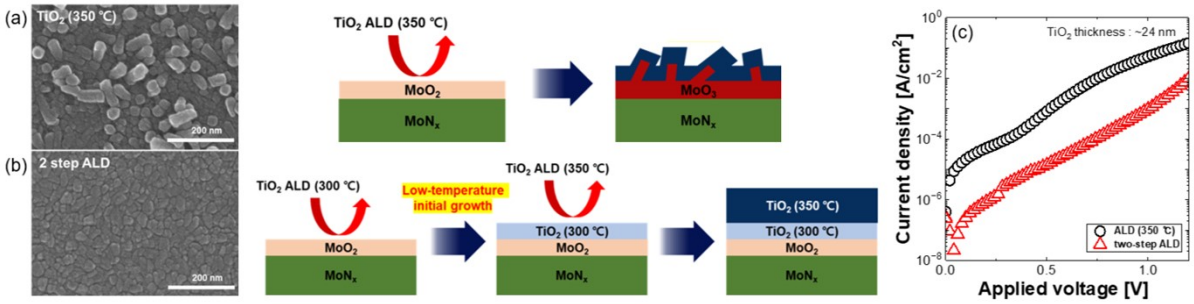

Figure S2. FESEM images and schematic illustration of (a) smooth TiO_2 and (b) rough TiO_2 surfaces depending on the ALD TiO_2 process conditions. A smooth TiO_2 surface was obtained via a two-step ALD process (300 → 350 °C), whereas rod-like surface structures were observed after high-temperature (350 °C) ALD, attributed to the oxidation of the underlying MoO_x layer. (c) Leakage current density of ALD TiO_2 films on MoO_x/MoN_x bottom electrodes depending on the ALD TiO_2 process condition.

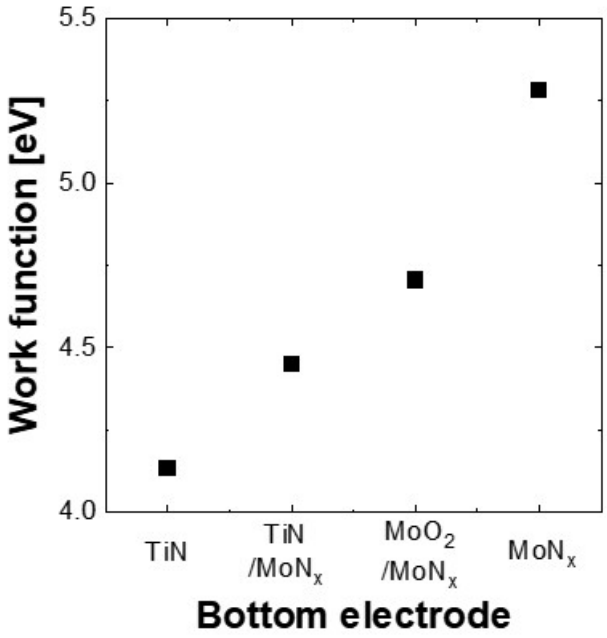

Figure S3. Comparison of the work functions of MoN_x, 2-nm-thick MoO_2/MoN_x, 2-nm-thick TiN/MoN_x, and TiN electrodes measured by ultraviolet photoelectron spectroscopy