The effects of atomic layer deposition parameters on the interface states of TiN/ZrO_2 for MIM capacitor applications

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When the ZrO_2 is deposited on TiN electrode using the O_3 based ALD process, TiN electrode is oxidized by the reactant material (O_3),
and TiN/ZrO_2 interface layer is formed at the surface of TiN electrode. We confirm the TiN/ZrO_2 interface layer contains TiO_2, TiON, and ZrO_{2-x}
by using the angle-resolved X-ray photoelectron spectroscopy (ARXPS). In this study, we investigate the affect of process conditions
(substrate temperature, ozone concentration, ozone injection time) on the interface state of TiN/ZrO_2 and the electrical properties of MIM capacitor.