

Tailoring Interface and Bulk Properties: An Oxidant Co-Dosing Approach to ALD Growth of Hafnia Thin Films

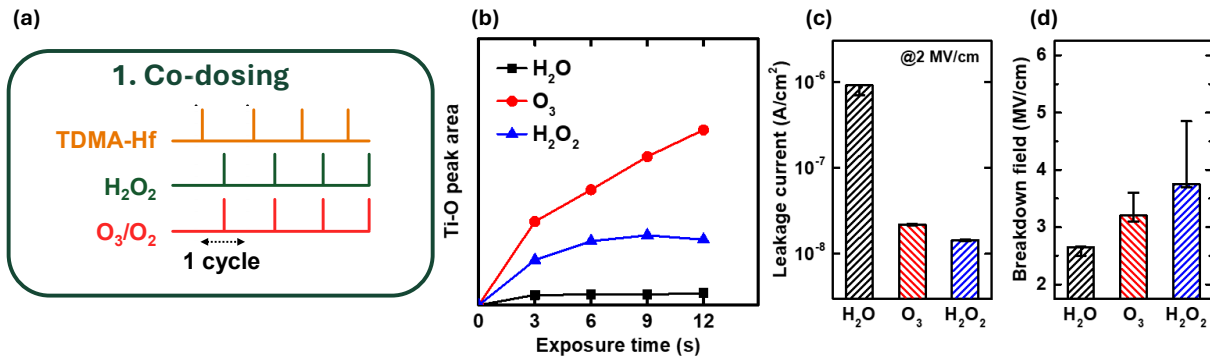


Fig. 1. (a) Schematic of ALD process with co-dosing of oxidants during hafnia growth cycles. (b) TiN oxidation measured with FTIR upon various exposure pulses of different oxidants (H₂O, O₃, and H₂O₂) without co-dosing. (c) Leakage current characteristics of 10 nm HfO₂ MIM capacitors grown with various oxidants without co-dosing. (d) Breakdown voltage characteristics of 10 nm HfO₂ MIM capacitors grown with various oxidants without co-dosing.

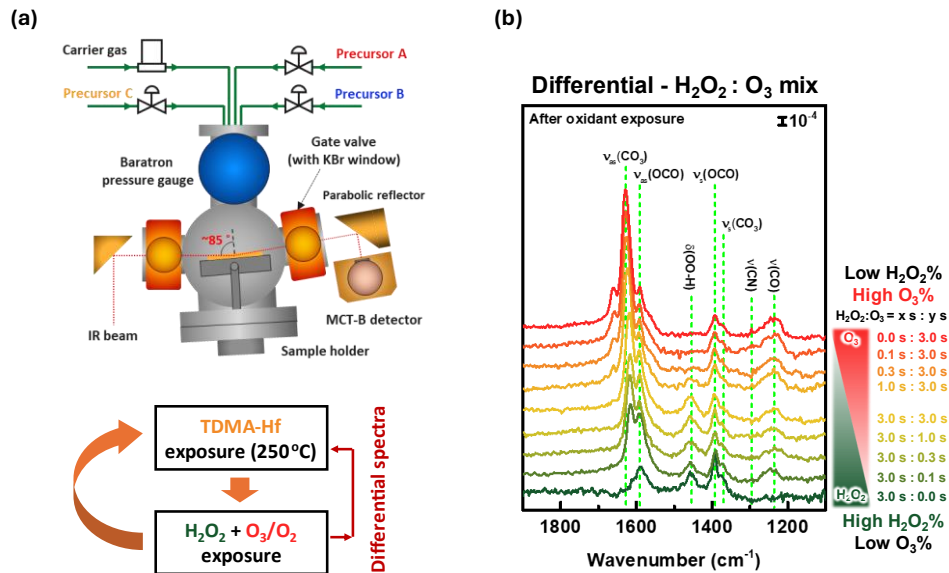


Fig 2. (a) Schematic of in-situ Reflection Absorption Infrared Spectroscopy (RAIRS) ALD system, with a schematic of data acquisition sequence. (b) RAIRS differential spectra showing oxidation mechanisms at the HfO₂ surface with different compositions of oxidant, mixing H₂O₂ and O₃.