

Supporting information

## Simultaneous Improvement of Dielectric Constant and Leakage Currents of ZrO<sub>2</sub> Dielectrics by Incorporating Highly Valent Ta<sup>5+</sup> Element

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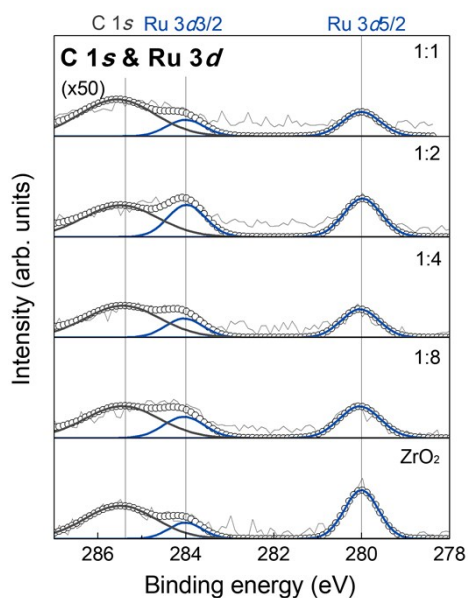


Figure S1. Ru 3d spectra of 10-nm ALD undoped and Ta-doped ZrO<sub>2</sub> on Ru