

Supplementary Information

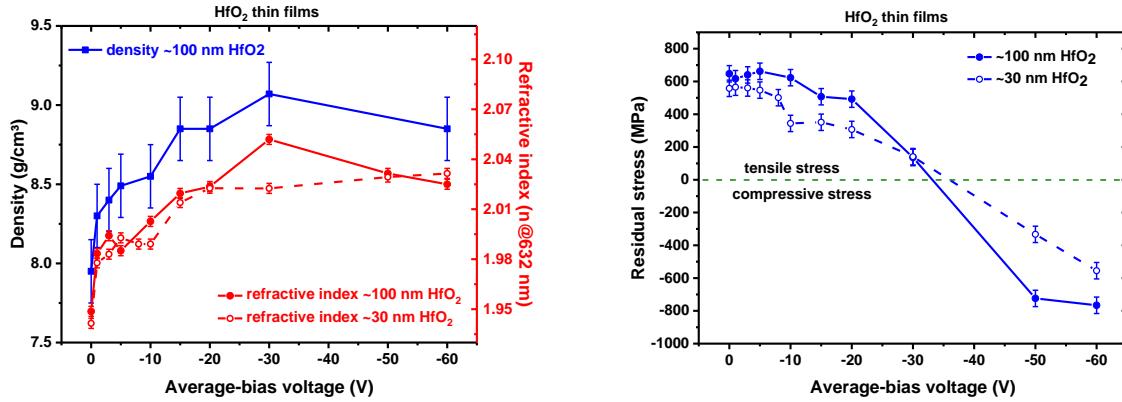


Figure 1. Effect of increase in average-bias voltage on (a) Density of ~100 nm films and refractive index of ~30 nm and ~100 nm films (b) Residual mechanical stress in ~30 nm and ~100 nm HfO₂ films deposited by PEALD.

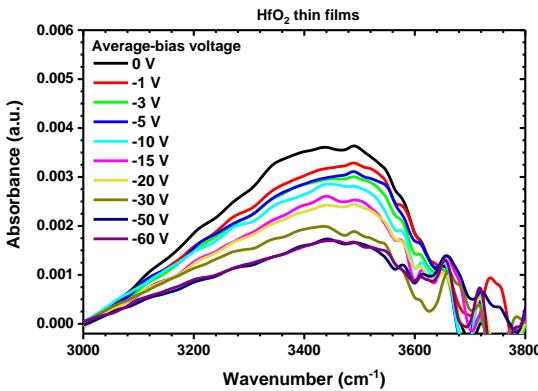


Figure 2. Effect of increasing average-bias voltage on OH incorporation into HfO₂ thin films measured by FTIR spectroscopy. The ~100 nm thin films deposited with the average-bias voltage of -50 V and -60 V showed minimum OH incorporation.

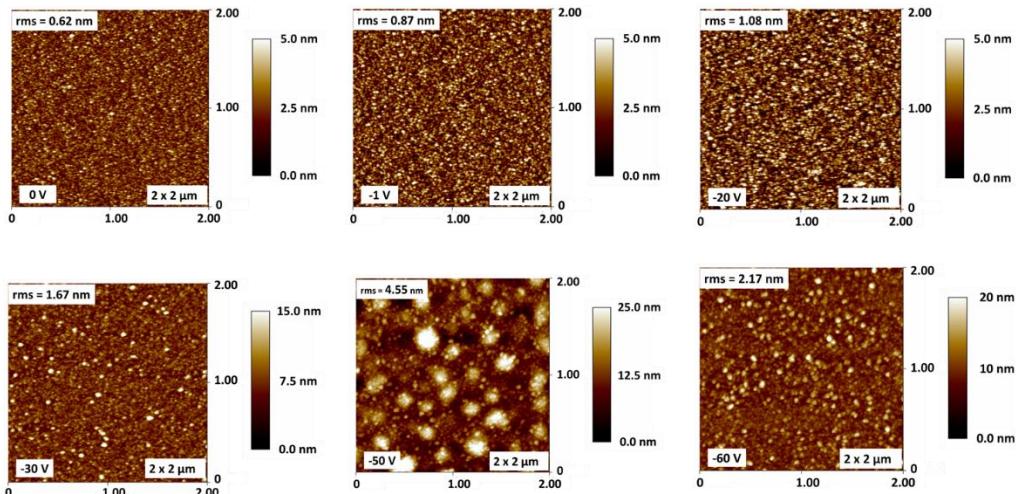


Figure 3. Effect of increase in average-bias voltage on rms roughness of ~100 nm HfO₂ thin films measured by AFM. The HfO₂ film deposited using -50 V average-bias voltage showed maximum rms roughness of 4.55 nm and nanocrystalline hillocks.