Supplementary Materials

Yttrium Doping Effects on Ferroelectricity and Electric Properties of As-deposited $Hf_{1-x}Zr_xO_2$ Thin Films via Atomic Layer Deposition

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1. XPS studies

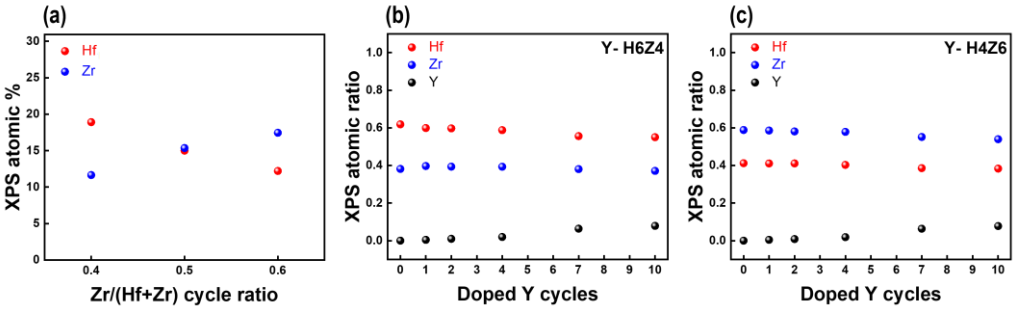


Figure S1. (a) X-ray photoelectron spectroscopy (XPS) atomic percent of Hf and Zr. XPS atomic ratio of Hf, Zr and Y in (b) as-deposited Y-H6Z4 thin films (c) as-deposited Y-H4Z6 thin films according to Y-doping cycle.

2. XRD studies

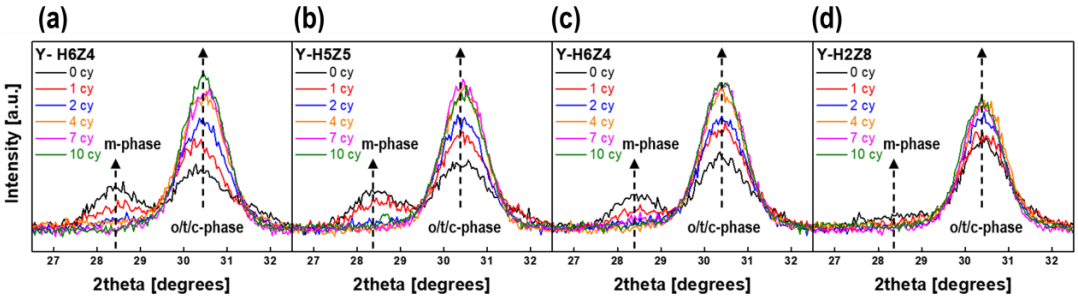


Figure S2. Grazing-angle incidence X-ray diffraction (GI-XRD) spectra of (a) as-deposited Y-H6Z4 thin films, (b) as-deposited Y-H5Z5 thin films, (c) as-deposited Y-H4Z6 thin films and (d) as-deposited Y-H2Z8 thin films according to Y-doping cycle.

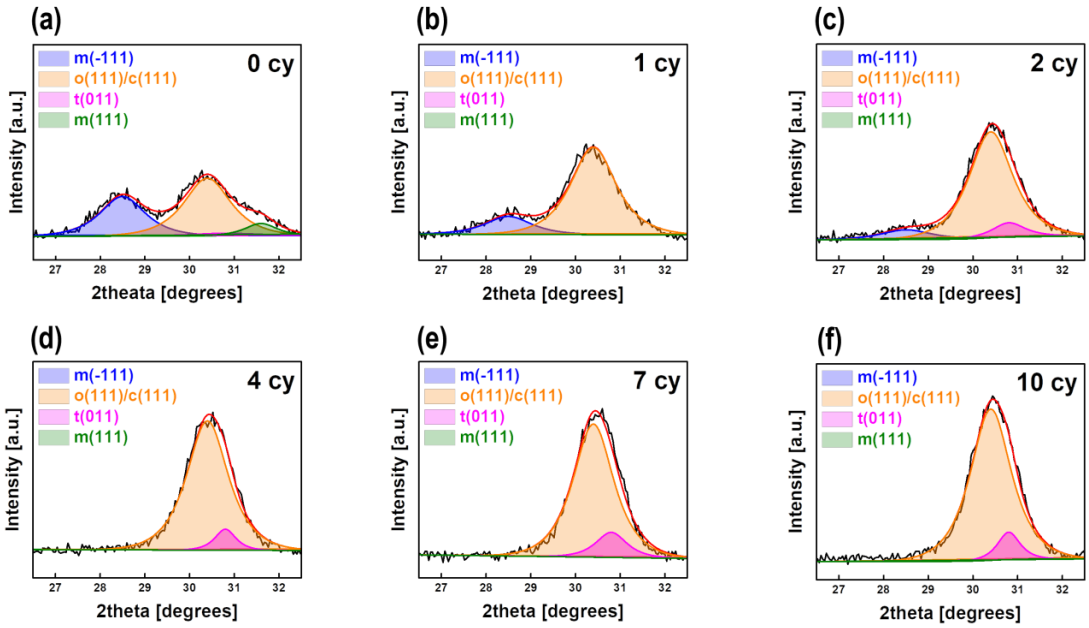


Figure S3. Peak deconvolution of grazing-angle incidence X-ray diffraction (GI-XRD) spectra of as-deposited Y-H6Z4 thin films with Y-doping cycle of (a) 0, (b) 1, (c) 2, (d) 4, (e) 7, (f) 10.