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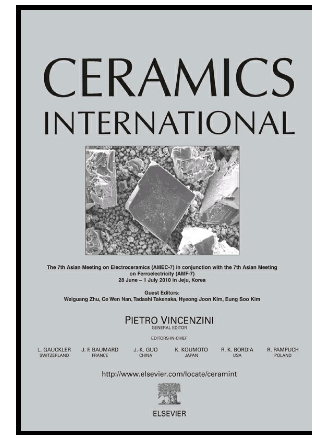

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Ferroelectric yttrium doped hafnium oxide films from all-inorganic aqueous precursor solution

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Abstract

We report a unique aqueous solution deposition method to prepare yttrium doped hafnium oxide (Y:HfO_2) thin films using all-inorganic reagents. The composition and chemical bonding features of the films were investigated using X-ray photoelectron spectroscopy. The Y:HfO_2 film was integrated into metal-insulator-semiconductor (MIS) structure capacitors for electrical measurements. A transition of the polarization behavior from apparent ferroelectric-type to linear dielectric-type was observed for films with thickness increasing from 25 nm to 80 nm, which is correlated to the dominant crystal structure change from high-symmetry phase to monoclinic phase evidenced by grazing incidence X-ray diffraction analysis.

Keywords: A. Films; B. X-ray methods; C. Ferroelectric properties; E. Capacitors

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