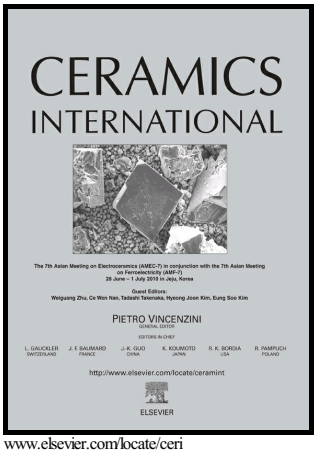
Ferroelectricity in ultrathin yttrium-doped hafnium oxide films prepared by chemical solution deposition based on metal chlorides and alcohol

Seonhyoung Kim, Jongin Hong



www.elsevier.com/locate/ceri

PII: S0272-8842(17)30994-X
DOI: http://dx.doi.org/10.1016/j.ceramint.2017.05.181
Reference: CERI15341

To appear in: *Ceramics International*

Cite this article as: Seonhyoung Kim and Jongin Hong, Ferroelectricity i ultrathin yttrium-doped hafnium oxide films prepared by chemical solutio deposition based on metal chlorides and alcohol, *Ceramics Internationa* http://dx.doi.org/10.1016/j.ceramint.2017.05.181

Ferroelectricity in ultrathin yttrium-doped hafnium oxide films prepared by chemical solution deposition based on metal chlorides and alcohol

Seonhyoung Kim, Jongin Hong*

Department of Chemistry, Chung-Ang University, 84 Heukseok-ro, Dongjak-gu, Seoul 06974, Korea

Abstract

We suggest a facile way to prepare precursor solutions with metal salts and alcohol and fabricate ultrathin ferroelectric yttrium-doped hafnium oxide films on Pt(111)/TiO_2/SiO_2/Si substrates by chemical solution deposition and post-annealing treatment. The samples were prepared with 5.2 mol% yttrium-doping and had a thickness ranging from 3 nm to 9 nm. We also varied the post-annealing temperature from 600 ^oC to 800 ^oC. The ultrathin films were characterized by transmission electron microscopy (TEM) and Raman spectroscopy. Their local ferroelectric properties were investigated by piezoresponse force microscopy (PFM) for domain imaging and polarization switching at nanoscale.

Keywords: A. Films; C. Ferroelectric properties; D. Transition metal oxides

1. Introduction

Hafnium oxide, HfO_2, is commonly used in optical coatings and high-κ dielectric insulators. Ever since the discovery of ferroelectricity in Si-doped HfO_2 in 2011 [1], HfO_2 has attracted much attention because of its compatibility with the standard semiconductor technology and its potential as a lead-free alternative for