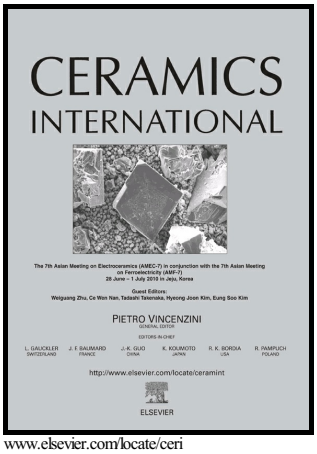
Structural properties and sensing performance of $CeTiO_3$ ceramic films as a solid-state pH sensor

Tung-Ming Pan, Tung-Yu Wu, Chi-Lin Chan, See-Tong Pang



www.elsevier.com/locate/ceri

PII: S0272-8842(18)30902-7
DOI: https://doi.org/10.1016/j.ceramint.2018.04.047
Reference: CERI17964

To appear in: *Ceramics International*

Received date: 13 February 2018
Revised date: 6 April 2018
Accepted date: 6 April 2018

Cite this article as: Tung-Ming Pan, Tung-Yu Wu, Chi-Lin Chan and See-Tong Pang, Structural properties and sensing performance of $CeTiO_3$ ceramic films as a solid-state pH sensor, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.04.047

Structural properties and sensing performance of $CeTiO_3$ ceramic films as a solid-state pH sensor

Tung-Ming Pan[a,b*], Tung-Yu Wu[a], Chi-Lin Chan[a], and See-Tong Pang[b]

[a]Department of Electronics Engineering, Chang Gung University, Taoyuan 33302, Taiwan
[b]Division of Urology, Chang Gung Memorial Hospital, Taoyuan 33302, Taiwan.
[*]To whom correspondence should be addressed. Tel: +886-3-211-8800, ext. 3349. Fax: +886-3-211-8507. E-mail: tmpan@mail.cgu.edu.tw.

Abstract

In this paper, we have studied the impact of postannealing treatment on the structural properties and sensing characteristics of $CeTiO_3$ ceramic membranes deposited on Si substrate by sputtering for solid-state electrolyte-insulator-semiconductor (EIS) pH sensors. X-ray photoelectron spectroscopy, Auger electron spectroscopy, X-ray diffraction, and atomic force microscopy were used to study the chemical compositions, elemental depth profiles, film structures, and surface morphologies of $CeTiO_3$ ceramic membranes treated at three rapid thermal annealing (RTA) temperatures of 700, 800 and 900 °C. The sensing performance of the $CeTiO_3$ ceramic membranes annealed at three different RTA temperatures is strongly correlated to their structural properties. The $CeTiO_3$ EIS device after RTA at 800 °C exhibited the best sensing characteristics (pH sensitivity, hysteresis voltage and drift rate) among these RTA temperatures. We attribute this