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Structural properties and sensing performance of CeTiO₃ ceramic films as a solid-state pH sensor

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Abstract

In this paper, we have studied the impact of postannealing treatment on the structural properties and sensing characteristics of CeTiO₃ 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 CeTiO₃ ceramic membranes treated at three rapid thermal annealing (RTA) temperatures of 700, 800 and 900 °C. The sensing performance of the CeTiO₃ ceramic membranes annealed at three different RTA temperatures is strongly correlated to their structural properties. The CeTiO₃ 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

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