

Effect of Pr on microstructure and dielectric properties of SrTiO₃

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Polycrystalline ceramics based on strontium titanate (SrTiO₃) have attracted great attention in recent years due to their interesting dielectric properties, e.g. high electric permittivity and low dielectric loss. SrTiO₃ has many applications in electronic devices, sensors, actuators, fuel cells, among others. Recently, the effects of dopants on the dielectric properties of SrTiO₃ have been investigated. Lui et al. [1] were the first to report a giant electric permittivity in Sr_{0.09}Pr_{0.01}TiO₃ (> 3,000) at room temperature. In this work, the effect of Pr (0.025, 0.05 and 0.075% mol Pr) on the microstructure and dielectric properties of SrTiO₃ was studied in detail.

Samples were characterized by density measurement, X-ray diffraction, scanning electron microscopy and impedance spectroscopy. The results show that sintered samples at 1500 °C/6 h exhibit high densities (> 96% of the theoretical value), independent on the additive content. The average grain size of SrTiO₃ increases slightly with Pr addition. Specimens containing 0.075% mol Pr show high giant permittivity (about 30,000) at 540 °C.

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References: [1] C. Liu, P. Liu, J. Zhou, Y. He, L. Su, L. Cao, H. Zhang, J. App. Phys. 107 (2010) 094108-1.