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STRUCTURAL, MICROSTRUCTURAL AND FERROELECTRIC PROPERTIES OF Ti-DOPED $YMnO_3$ CERAMICS SYNTHESIZED BY POLYMERIZATION COMPLEX METHOD

Olivera Milošević[1], Danijela Luković Golić[1], Milica Počuča-Nešić[1], Aleksandra Dapčević[2], Goran Branković[1], Zorica Branković[1]

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Yttrium manganite, $YMnO_3$, is a multiferroic material, which exhibits ferroelectric and antiferromagnetic behavior. These properties make it suitable for various applications [1]. Large microcracking and porosity in $YMnO_3$ ceramics strongly affect the material's ferroelectric response [2]. In this work, the effect of Ti doping on structure, microstructure and ferroelectric properties of $YMnO_3$ ceramics was investigated. The powders $YMn_{1-x}Ti_xO_3$ (x = 0; 0.10; 0.15; 0.20) were prepared by polymerization complex (PC) method from citrate precursors, and calcined at 900 °C for 4 h. The ceramic samples $YMnO_3$ (YMO) and $YMn_{0.9}Ti_{0.1}O_3$ (YMTO10) were obtained after sintering at 1400 °C, $YMn_{0.85}Ti_{0.15}O_3$ (YMTO15) – at 1450 °C and $YMn_{0.8}Ti_{0.2}O_3$ (YMTO20) – at 1470 °C, for 2 h. Structural properties and phase composition of sintered samples were analyzed by X-ray diffraction (XRD) and their microstructure by scanning electron microscopy (SEM). Ferroelectric characterization was carried out by measuring of $P(E)$ hysteresis loops and leakage current density (j_l). XRD patterns of all ceramic samples revealed single-phased hexagonal ($P6_3cm$) structure. It was observed that Ti-doped $YMnO_3$ ceramic samples have reduced microcracking, inter- and intragranular porosity. Leakage current densities of the samples YMTO10 and YMTO20 were lower compared to that of sample YMO. YMTO20 showed higher electrical conductivity, but all samples indicated weak ferroelectric response.

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