

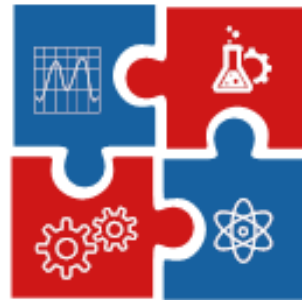
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29 June – 02 July 2021

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THE INFLUENCE OF MECHANICAL ACTIVATION ON MICROSTRUCTURE AND DIELECTRIC PROPERTIES OF SrTiO₃ CERAMICS

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Abstract

In recent years, a lot of interest has been shown in obtaining materials with predetermined properties. The aim is to establish a functional dependence between the synthesis parameters, structural characteristics, and properties of the material. Ceramic materials based on strontium titanate (SrTiO₃) are of special interest due to their unique physical-chemical properties. Having in mind the importance of examining the influence of synthesis parameters on the process of obtaining and properties of functional electroceramic materials, and the importance of SrTiO₃ as a perovskite material, the motive was to analyze and consider the influence of mechanical activation. It has been established that the time of mechanical activation (0, 10, 30, 60, 90, and 120 minutes) of SrTiO₃ powders indirectly affects on electrical properties of SrTiO₃ ceramics. It was noticed that in SrTiO₃ ceramics the values of relative dielectric permittivity in the radio frequency range (0,3 MHz-3 GHz) are stable, which is important for the fabrication of electronic components. Microstructural SEM analysis showed that the increase in mechanical activation time results in less porous samples. It was found that the value of the relative dielectric permittivity of ceramic samples at room temperature changes following the combined effect of changes in sample density, grain size, as well as changes in the grain boundary region. The maximum value of dielectric permittivity was observed in the sample activated for 10 minutes. Also, the sample activated for 10 min exhibits relatively low values of loss tangent, compared to the other mechanically activated samples, providing the best overall dielectric performance compared to other samples.

Keywords:

strontium titanate, mechanical activation, sintering, electrical properties

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