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Electronic ceramics fractal microstructure analysis - Minkowski Hull and grain boundaries

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Abstract

Consolidation parameters have influence and can be used to control structure of BaTiO₃ based materials. Microstructure and dielectric properties of Yb₂O₃ doped BaTiO₃-ceramics, sintered from 1320 °C to 1380 °C have been investigated. The correlation between microstructure, capacity and dielectric properties of doped BaTiO₃-ceramics, based on fractal geometry and micro-contact surfaces, has been developed. Using the fractal descriptors of the grains contact surface, the microstructure reconstruction constituents, as grains and pores shapes or intergranular contacts, has been successfully done. Obtained results indicated that fractal analysis contact surfaces descriptors of different shapes are very important for the prognosis of BaTiO₃-ceramics microstructure and capacity and dielectric properties. The morphology of ceramics grains pointed out the validity of developing new structure analytical methods, based on different grains' shape geometries. The grains contact structure based on Minkowski hull is presented as a new tool for BaTiO₃-ceramics materials structure research. The materials properties prognosis are determined according to the correlations synthesis-structure-property, within Minkowski hull fractal frame.

Keywords: grains, ceramics, Minkowski hull, microelectronic

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