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ADVANCED CERAMICS AND APPLICATION III
New Frontiers in Multifunctional Material Science and Processing

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Institute of Chemistry Technology and Metallurgy
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The Fractal Nature Grains Shape Reconstruction on the Way to Microstructure Prognosis

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The structure of BaTiO₃ based ceramics materials, can be controlled by using different pressing pressures, sintering temperatures and different additive concentrations. In this paper, microstructure properties of Ho₂O₃ doped BaTiO₃-ceramics have been investigated. Different concentrations have been used, as well as different sintering temperatures. The ratio of dopant concentration ranges from 0.05% to 1%. Also, three different sintering temperatures are applied (1320°C, 1350°C and 1380°C). For selected contacted grains, the SEM (Scanning Electron Microscope), equipped with EDS (energy dispersive spectrometer) microphotographs are taken providing suitable configuration for structural and electrical model study. Analysis of SEM are twofold. The first one is based on conversion of 2D digital gray photos into numerical data, which represent 3D surface defined over dimensions of the microphotograph. The second analysis of fractal (box-counting) dimension direct calculation by using gray microphotographs graphical analyzing program is done. From above analysis, the important conclusions, are taken concerning the considered materials, from the frontiers view points, the ceramics structures prognosis within the electronic properties designing.

Keywords: BaTiO₃-ceramics; fractals; microstructure; microphotograph