

Microstructural Studies on the Reoxidation Behavior of Nb-doped SrTiO₃ Ceramics

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Abstract

We report several structural and chemical phenomena that were observed after high temperature annealing (1200°C) of 5 at.% Nb-doped polycrystalline SrTiO₃ in oxygen. The oxidation led to the formation of islands on the surface which, depending on the surface orientation of the grains, exhibit characteristic shapes, densities, and lateral directions. A correlation between grain orientation and tendency towards island formation was found. Structure and composition of the islands and the bulk were investigated by transmission electron microscopy. The bulk interior of the oxidized SrTiO₃ was found to exhibit compositional changes and Sr-rich secondary phases were found at the triple grain junctions. The results are discussed in terms of the defect chemistry of SrTiO₃.

Keywords: Perovskites, BaTiO₃ and titanates, Surfaces, Defects, Electron microscopy