

Resistive polished surfaces of Nb-doped strontium titanate

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Abstract

Impedance spectroscopy has been used to separate different microstructural contributions of Nb-doped strontium titanate ceramics. The spectra obtained cannot be interpreted as a simple combination of contributions ascribable to the bulk behaviour, resistive grain boundaries and external interfaces. The actual behaviour shows at least a fourth contribution with typical capacitance values in the same order of magnitude of the grain boundary contribution. Though these contribution were previously interpreted based on core-shell models [1], more recent results show that one of those contributions of the impedance spectra are much higher for polished than for unpolished samples. On re-heating at sufficiently high temperatures, the differences between samples with polished and unpolished surfaces decrease. These results suggest that polishing may originate a resistive contribution, possibly in the form of a highly strained layer formed in contact with the abrasive. Other possible effects such as the enhanced reactivity of polished surfaces with atmospheric gases (e.g. carbonation) are less plausible.

[1] J.C.C.Abrantes, A.Feighery, A.A.L.Ferreira, J.A.Labrincha, J.R.Frade, An impedance spectroscopy study of Nb-doped strontium titanate ceramics, *J.Amer.Ceram.Soc.*, 85 (2002) 2745-52