

## **Ti-Doped Corundum Polycrystals: Dielectric and optical Behaviour versus the Synthesis Procedure.**

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### **Abstract:**

Two synthesis routes have been used for obtaining similar compositions of Ti-doped alumina ceramics: oxides mechanical mixing and modified Pechini process.

The dielectric behaviour of the samples has been checked in the range of frequencies between 0,1 Hz and 10 GHz at room temperature. On the other hand, microstructure characterisation, crystal structure, and optical properties as a function of the dopant level were measured in order to find a relationship among the defect structure and the dielectric response.

The samples produced by the two synthesis routes show similar photoluminescence properties. The intensity of the 420 nm emission band due to  $Ti^{4+}$  presents a maximum for samples with a concentration of about 1000 ppms of dopant.

By the contrary, differences appear in dielectric behaviour. For example, samples produced by the Pechini process show higher dielectric losses at low frequencies than those obtained by mixing oxides, as well as lower density and dielectric constant. The results are discussed on the basis of three different thesis: i) the residual carbon species produced during the organometallic decomposition that remain into the sintered bodies, ii) the different sintering mechanism that occurs in the two systems and iii) the different relative concentration of  $Ti^{3+}$  and  $Ti^{4+}$  as well as their different location into the corundum structure, giving rise to a different defect distribution into the lattice.