

Micro-structural properties of ZnO-TiO₂ samples obtained from oxides synthesized by the sol-gel method assisted by Tapioca

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This work reports the obtaining of a ceramic material from the ZnO-TiO₂ system (1:1) from the use of the sol-gel process assisted by Tapioca. At first, ZnO and TiO₂ powders were synthesized via sol-gel using Tapioca as a chelating agent. The second stage consisted of grinding and homogenizing in a ball mill, both of the oxides synthesized via sol-gel, as well as those commercially purchased, ZnO (Synth, 99%) and TiO₂ (Sigma-Aldrich, 99%). The resulting powders were characterized by XRD. After characterization, the powders were formed in a uniaxial press (13MPa) and sintered at 1100°C/2h with a heating rate of 5°C.min⁻¹. The sintered samples were characterized by XRD, SEM and the density, porosity and volumetric shrinkage of the samples were also determined. After grinding, the phases presented by the powders are compatible with zincite (ZnO) and anatase (TiO₂). After sintering, regardless of the precursor oxide used, the phases provided by the diagram [1] in the composition and temperature used, Zn₂TiO₄ and TiO₂, were observed. The samples obtained using oxides synthesized via sol-gel, presented smaller grains, greater volumetric retraction (10%) but maintained the same apparent density and porosity. Therefore, it was possible to obtain a bulk of the ZnO-TiO₂ system (1:1), from powders synthesized by a solgel route assisted by Tapioca, with microstructural properties reasonably similar to samples obtained using higher cost commercial oxides.