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Nanocrystalline ZrO₂ Prepared by Sol-gel: the Role of Carbon and Nitrogen Impurities on the Phases Formation of Pure and Doped Samples

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Nanocrystalline powders of pure and 7.0 % mol ZrO₂:Pr³⁺ were prepared by sol-gel method starting from acetates. For comparison pure ZrO₂ powders were prepared through non-carbonic sol-gel route using Oxynitrates. The gels were dried at 110oC/48h in air and calcined for 4 h at different temperatures, to study the influence of Carbon in the mechanisms of phases formation. The dried gels and powders were characterized by thermal analysis, X-ray diffraction, and infrared spectroscopy. In carbonic route pure ZrO₂ and ZrO₂:Pr³⁺ presented tetragonal phase that remained stable up to 700oC. For the dried gel calcined at 950oC pure ZrO₂ powders had tetragonal and monoclinic phases, and ZrO₂:Pr³⁺ remained tetragonal. The dried gel prepared through non-carbonic route calcined at 520oC produced Zirconia with tetragonal and monoclinic phases. These phase transformations occurred simultaneously with significant mass losses observed in TG curves, attributed to carbon elimination. The residual carbon content plays an important role in mechanism of Zirconia phases

Key words: Zirconia, Praseodymium, Carbon elimination, Phase stabilization.