Influence of Synthesis Parameters on Oxide Ceramic Nanoparticles Characteristics

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Nanocrystalline ceramic materials have advantages as reduced sintering temperatures and improved properties. This is one of the ceramic powder particles requisite for an ideal powder, as well as dense spherical particles, controlled particle size distribution, minimal agglomeration, low crystallite size and high value for specific surface area. Related to the improved properties for the applications, specific requirements are necessary for processing, mainly related to ceramic particle characteristics, and for better sintering conditions (improving densification at lower temperatures). It is possible to change synthesis conditions and reaction media to obtain ceramics with controlled characteristics as particle size distribution, grain size and morphology. The aim of this work is the study of synthesis parameters of oxide ceramics and the sintering parameters to explore the effect of each series of treatments on the densification and microstructural evaluation of the samples, obtained from nanometric particles. Chemical synthesis were used to obtain these oxide ceramics. Samples were characterized by X-ray diffraction (XRD), N_2 adsorption (BET), scanning electron microscopy (SEM) and the sintering profile was analysed by dilatometry. It was observed that densification and suppression of the grain growth could be achieved by exploiting the difference in kinetics between grain boundary diffusion and grain-boundary migration.