Effect of solvent on surface structure characteristics of chemically synthesized samaria-doped ceria nanoparticles.

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Ceria is a rare-earth oxide with fluorite-type structure that may incorporate different cations by partial substitution in the cation sublattice. The wide range of applications of these compounds has been enlarged with the advent of nanostructures, which may exhibit new or optimized properties [1]. Samaria-doped ceria is a candidate material to be used as solid electrolyte in intermediate-temperature solid oxide fuel cells, due to its high ionic conductivity. In view of high density of interfaces, e.g, grain boundaries, in the nanostructured solid electrolytes, the interfaces play an important role in ion transport in such materials. It has been observed that the grain boundaries in these solid electrolytes often act as an additional blocker to current flow, thereby decreasing the ionic conductivity of the polycrystalline materials by orders of magnitude when compared to that of the single crystals. Significant progress towards an understanding of the grain boundary resistivity has been made in recent years [2].

In this work, $Ce_{0.8}Sm_{0.2}O_{1.9}$ solid solution was prepared by homogeneous precipitation using several mixtures of water/alcohol as solvent, and characterized by small-angle X-ray scattering and transmission electron microscopy. The main purpose of the present investigation was to study the surface characteristics of the synthesized nanoparticles to obtain a comprehensive understanding on the role of these properties in the densification and mass transport behaviors of this material.

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