

Synthesis of lanthanum silicate oxyapatite ceramic powder as a solid oxide fuel cell electrolyte by a new modified sol gel method

Daniel Ricco Elias¹, Sabrina Lopes Lira², Mayara Rafaela Soares Paiva³, Agatha Matos Misso⁴,
Chieko Yamagata¹

¹ *Nuclear and Energy Research Institute - Sao Paulo, Brazil*

² *Institute of Chemistry of Sao Paulo University - Sao Paulo, Brazil*

³ *Centro Universitario Sao Camilo - Sao Paulo, Brazil*

⁴ *Faculdade Oswaldo Cruz - Sao Paulo, Brazil*

^ayamagata@ipen.br

Keywords: Sol-gel process; Lanthanum silicate; Apatite; Solid oxide fuel cell.

Abstract.

In recent years, lanthanum silicate oxyapatites ($[\text{Ln}_{10-x}(\text{XO}_4)_6\text{O}_{3-1.5x}]$ (X=Si or Ge)) have been studied for use in SOFC (Solid Oxide Fuel Cells) due to its ionic conductivity, at low temperature (600-800°C), which is higher than that of YSZ (Yttrium Stabilized Zirconia) electrolyte. It is one promising candidate as the solid electrolyte for intermediate-temperature SOFCs. Synthesis of functional nanoparticles is a challenge in the nanotechnology. In this work, lanthanum silicate oxyapatite nanoparticles were synthesized by sol gel technique followed by chemical precipitation of lanthanum hydroxide on silica gel. A Na_2SiO_3 waste solution was used as silica source; HCl was used for initially preparing silica spherical aerogel. The obtained powders of oxyapatite were characterized by thermal analysis, X-ray diffraction, scanning electron microscopy (MEV) and specific surface area measurements (BET). The oxyapatite phase may be obtained at 900°C.