Preparation of $Sr_2(MgMo)_{1-x}Ru_xO_6$ ceramics for use in a solid oxide fuel cell anode

Matheus Eiji Ohno Bezerra[1], Fabio Coral Fonseca[2], Daniel Zanetti de Florio[1]

[1]Universidade Federal do ABC, [2]Instituto de Pesquisas Energéticas e Nucleares

e-mail: matheus.eiji@aluno.ufabc.edu.br

Solid Oxide Fuel Cells are the most efficient devices known for the direct conversion of fuels into electric energy. Such devices have advanced steadily and are already available for specific applications such as portable power and residential stationary generation. The main objective of this work is the development of anodes for SOFC operating directly with renewable fuels, without the addition of water and using strategic fuels such as ethanol and natural gas. Specifically, a family of mixed ionic-electronic compounds has been investigated: the double perovskites with compositions $Sr_2(MgMo)_{1-x}Ru_xO_6$ with x = 0; 1; 2; 5; 10 e 20 at.%. This material has been synthesized by polymeric precursor method. The resins were prepared by combining stoichiometric amounts of the starting solutions. The resulting solution was heated treated under magnetic stirring. The thermal decomposition of the polymeric resin was studied by means of simultaneous thermogravimetric and differential scanning calorimetry up to 1500 °C with heating and cooling rates of 10 °/min in Ar. The thermal decomposition result shows mass loss up to, approximately, 900 °C. However X-ray diffraction analyses of the powder heat treated at 900 °C and 1200 °C presents a considerable content of an undesiderate phase ($SrMoO_4$). According to the literature for similar compounds a thermal treatment under reduction conditions could be necessary to obtain the double perovskites single phase. After this treatment the material will be characterized regarding its electrical properties. The expected results will contribute to advance both the understanding of the mixed ionic electronic ceramics and the SOFC technology using renewable fuels.