Oxidation resistance ferritic stainless steel AISI 430 coated with spinel based Fe doped Ni-Co

Alexander Bervian, Gustavo A. Ludwig, Matias A. de Korb, Célia de F. Malfatti, Laboratory of Corrosion Research (LAPEC), PPGE3M, Federal University of Rio Grande do Sul, Porto Alegre/Brazil

Fuel cells are an attractive alternative for the production of energy with few environmental impacts and high yield conversion of chemical energy into electrical energy. In order to multiply the SOFC electrical power, a series of single cells is connected by interconnects. The Interconnects provide electric contact between the electrodes as well as separation of air and fuel. The metallic interconnect has many advantages of low material cost, good mechanical properties, high thermal conductivity and easy manufacturing process to large area. However, one major concern with metallic interconnects is their oxidation during the ITSOFC (intermediate temperature solid oxide fuel cell) operation, which in a temperature range between 600 and 800 °C. The oxidation can affect their long-term stability and contact resistance. One approach to improving the oxide growth resistance of metallic interconnects is to apply a coating that may reduce the rate of oxide formation as well as modify the properties of the oxide that is generated by the substrate. Therefore, compact, electronically conductive and low-cost surface coatings for metallic interconnects need to be developed. The aim of this work is to develop a conductive ceramic coatings for application as interconnector in Intermediate Temperature Solid Oxide Fuel Cell. The oxides of type spinel are more applicable due to its thermal expansion coefficient compatible with the other components of the cell. Besides, this coating can promote a barrier to the chromium volatilization and oxygen diffusion. In this work coatings based Fe doped Ni-Co will be to attain by of dip-coating process on ferritic stainless steel AISI 430. After heat treatment, it is intended to obtain the phase of the spinel in order to protect stainless steel against oxidation, other than those previously reported. The films will be characterized by SEM, EDS, XRD, oxidation resistance and also for adherence. It is porpuse to develop a uniform film, adherent and without cracks and fissures.