conferenceseries.com

Res. Rev. J Mat. Sci. 2018, Volume 6
DOI: 10.4172/2321-6212-C1-015

4th International Conference and Expo on

Ceramics and Composite Materials

May 14-15, 2018 | Rome, Italy

Influence of impregnation parameters on structure and properties of plasma sprayed alumina coating impregnated by aluminium phosphate

Patrice Brun, **Sophie Schuller** and **Jacques Lacombe**
CEA, DEN, DTCD, SCDV, LDPV F-30207 Bagnols-sur-Cèze, France

This paper deals with the physical properties and the structure of electrical insulation barriers based on a thermal sprayed alumina coating. The objective of this coating is to protect stainless steel components submitted to electrical potential differences in an induction furnace. The process constraints (corrosive atmosphere, radiated energies, thermal stress, and mechanical constraints) forbid to use organic compounds. Only ceramics meet the needs of the process. Moreover, there are implementation constraints because the stainless steel areas to be protected are complex shaped and large size. To protect electrically stainless steel substrates over a wide area, the most commonly used technique is the thermal spraying of an alumina coating. These coatings are known to form an electrical insulation barrier that protects efficiently the stainless steel structures subjected to high differences of voltage. However, for specific applications, electrical conductor liquids inlet or corrosive gases inlet requires to seal the open and/or interconnected porosity of the alumina coating with aluminium phosphate. The sealing procedure has been realized by impregnation of thermal sprayed alumina coating with a mono aluminium phosphate solution (MAlP) and applying heat treatment to the system. This procedure is characterized by parameters related to the impregnation technique (vacuum, brush and spray), the heat treatment, and the impregnating solution. We show in this paper how these different parameters impact the coating physical properties (thermal and electrical tests). A diffusion barrier at the liquid inlet and presenting a good electrical insulation in aggressive conditions is finally obtained.

patrice.brun@cea.fr