EMCMRE-1
Marrakech-Morocco
November 21-25 2011
First Euro-Mediterranean Conference on Materials and Renewable Energies (EMCMRE-1) 21-25 November 2011

Preparation of alumina films on FeCrAl (ce) stainless steel

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Abstract :
FeCrAl(Ce) stainless steel was functionalized by a conversion treatment in order to allow alumina by diffusion coatings with strong interfacial bonding. The very porous conversion coating produced in a pack aluminization technique had excellent adhesion and was conductive enough to permit conditions favorable for the precipitation of of alumina oxyhydroxide during Aluminnum diffusion coatings. In this work, the bed was prepared as a mixture of Al, NH4Cl and Al2O3 and heat-treated at 900°C in an atmosphere made up of steam with subsequent air-cooling. The effect of the bed content on the coating was examined. With the high-activity, the desired Fe2Al5 was formed as the outermost coating layer.
The coating presented chimical composition gradients suitable for strong adhesion. The improvement of the thermal oxidation behaviour was studied at 1273K. Two different aqueous environnements, which are (1) NaCl and (2) H_2SO_4, are employed for using the technique of potentiodynamic polarization curve.The obtained experimental electrochemical parameters (Ecorr, Jcorr, etc) were used to compare the corrosion resistance of the tested steel state complemented by electronic scanning microscopy (MEB) in combination with dispersive analysis X in energy (EDS) or X ray diffraction and XPS indicated that the elements concentration maximum was located in the vicinity of the interface especially in the FeCrA(Ce) B. These results are discussed in terms of a addition effect on the development of the microstructure of oxide films.

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