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Study of intermetallic compounds of X182CrN11-1 steel hot dipped into molten aluminum

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Abstract : Aluminum coating technique has been applied to improve high temperature oxidation resistance of steels. This method is adopted widely due to the low cost and good performance. The principle of hot-dip aluminizing is accomplished by immersing materials into molten aluminum bath to form multiple aluminized layers on the surface of material by atomic inter-diffusion between dipped materials and aluminum. This work focuses on the study of intermetallic layers formed during the hot dip aluminizing of steel with 1.82 % carbon strongly combined with chromium (10.8 %) into a molten aluminum bath. The X182CrN11-1 steel specimens were immersed into molten aluminum at 750°C for 1h, 2h and 3h. Intermetallic compounds were analyzed by optical microscope and scanning electron microscope (SEM) coupled with energy dispersive X-ray spectroscopy (EDS). This study is complemented by microhardness testing. The results showed that hot dip aluminized layer was divided into an outer pure aluminum topcoat and an intermetallic layer. This intermetallic layer consisted of an outer FeAl layer and an inner Fe₂Al₅ layer with tongue/finger-like morphology and the microhardness testing records high values of the intermetallic formed (through the) up to 800Hv0

Keywords : aluminizing, intermetallic, diffusion, steel, Microhardness