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PENGARUH IMPLANTASI ION ALUMINIUM TERHADAP KETAHANAN KOROSI SUHU TINGGI BAJA *CORTEN*

Wagiyo H.[1] dan Wulan P.[2]
[1]Pusat Teknologi Bahan Industri Nuklir (PTBIN)-BATAN
Kawasan Puspiptek Serpong 15314, Tangerang
[2]Jurusan Teknokimia Nuklir, STTN
Jl. Babarsari Kotak Pos 6101 Ykbb, Yogyakarta 55281

ABSTRAK

PENGARUH IMPLANTASI ION ALUMINIUM TERHADAP KETAHANAN KOROSI SUHU TINGGI BAJA *CORTEN*. Telah dilakukan implantasi ion aluminium pada permukaan baja *corten* dengan energi ion 100 keV menggunakan dosis $0{,}89527\times10^{16}$ ion/cm^2; $1{,}7905\times10^{16}$ ion/cm^2; $2{,}6858\times10^{16}$ ion/cm^2; $3{,}581\times10^{16}$ ion/cm^2; $4{,}4764\times10^{16}$ ion/cm^2 dan $5{,}3716\times10^{16}$ ion/cm^2 dan arus ion 20 μA. Kemudian dilakukan karakterisasi dan uji korosi suhu tinggi (oksidasi). Uji korosi suhu tinggi dilakukan menggunakan tungku *tubular* yang dialiri uap H_2SO_4, pH 0,3 yang *dibuble* udara dengan kecepatan alir 0,10 liter/menit, pada suhu 650 °C selama 50 jam. Karakterisasi struktur mikro dan komposisi kimia permukaan menggunakan *SEM-EDS* dan strukur kristal (fasa) menggunakan *XRD*. Dari hasil uji korosi suhu tinggi diperoleh baja *corten* yang mempunyai ketahanan korosi paling tinggi adalah yang diimplantasi dengan dosis ion aluminium sebesar (5.3716×10^{16} ion/cm^2), dengan lapis lindung berupa oksida aluminium dan butiran oksida di permukaan yang tersebar merata.

Kata kunci : Implantasi ion aluminium, Ketahanan korosi suhu tinggi, *XRD*, *SEM-EDS*

ABSTRACT

THE EFFECTS OF ALUMINUM ION IMPLANTATION ON THE HIGH TEMPERATURE CORROSION RESISTANT OF CORTEN STEEL. Surface treatment of corten steels using aluminum ion implantation method have been carried out. The ion energy used was 100 keV and the current was 20 μA,. Irradiation doses applied were 0.89527×10^{16}, 1.7905×10^{16}, 2.6858×10^{16}, 3.581×10^{16}, 4.4764×10^{16} and 5.371×10^{16} ion/cm^2. After these treatments a high temperature corrosion (oxidation) test was done on the samples, then the properties of the samples were characterized. Corrosion test were carried out at 650°C for 50 h in a tubular furnace filled with flowing H_2SO_4 gas of pH 0.3 atmosphere, and the air was bublled with flowing rate of 0.10 litre /min. The surface microstructure and chemical compositions were characterized using SEM-EDS and the crystal structure of phases was determined using XRD. From this high temperature corrosion test result, it was found that the corten materials with the highest temperature corrosion resistant is the sample which was implanted with aluminum ion dose of 5.3716×10^{16} ion/cm^2, which having a protecting layer of aluminum oxide particle dispersed homogenously with other oxides on the surface.

Key words : Aluminum Ion Implantation, High temperature corrosion resistant, XRD, SEM-EDS