SURFACE PROPERTIES ENHANCEMENT OF MAGNESIUM ALLOYS BY LOW ENERGY HIGH CURRENT PULSED ELECTRON BEAM

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Mg-based light alloys have had increasing attention in the past few decades, due to their specific properties of low density and high strength/ductility ratio. Because of these properties Mg alloys are suitable to replace aluminium alloys and steels in some industrial components. The major problem to use Mg alloys are surface related issues, such as poor wear and corrosion resistance, that have strongly limited their potential for some specific applications.

Therefore, surface treatment techniques are used to improve surface properties of the light alloys for global performance. The low-energy high-current pulsed electron beam (LEHCPEB) process is a relatively new surface modification technique. This technique is used to improve corrosion resistance by dissolution of intermetallic phases and forming a supersaturated solid solution and rapid solidification on surface of the Mg alloys. This technique improves surface properties and especially corrosion resistance.

This work focuses largely on providing information on microstructure characterization, microhardness, XRD analysis and corrosion resistance of the LEHCPEB treated AZ91D and AM60B Mg alloys at different number of pulses and electron energies. Potentiodynamic polarization measurements showed that there is an improvement in corrosion resistance after the LEHCPEB treatments. The corrosion resistance is affected by the number of pulses and electron energy given by LEHCPEB.

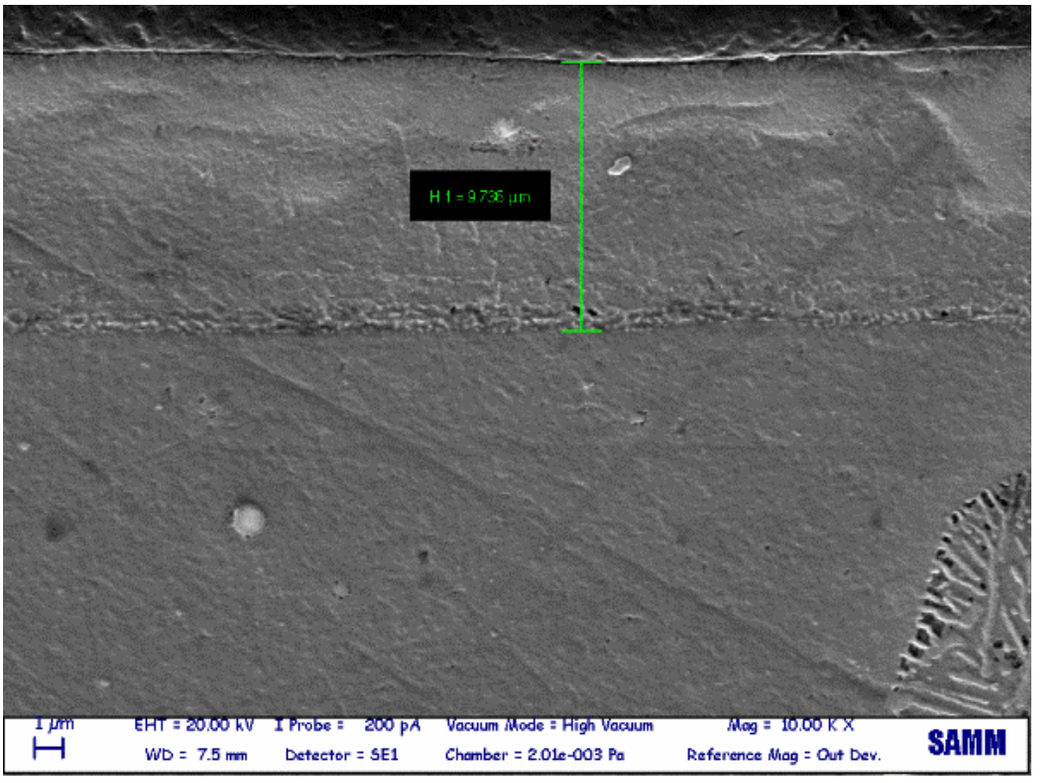

Fig. 1. SEM cross section micrograph of AZ91 alloy after LEHCPEB with 16 pulses and 25 KeV electron energy.