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Corrosion and wear resistance of PEO coatings containing graphite nanoparticles produced on magnesium alloys

L Pezzato¹, V Angelini², K Brunelli¹ and M Dabalà¹¹University of Padua, Italy²University of Bologna, Italy

Plasma Electrolytic Oxidation (PEO) is a very promising process that can enhance the corrosion and wear resistance by producing a relatively thick, dense and hard oxide ceramic coating on light alloys. The corrosion and wear behaviour of the treated samples strongly depends on some process parameters: current density, voltage, treatment time and electrolyte composition. In particular, the addition of additives in the electrolyte produces significant changes in the resistance of the obtained coatings. In literature several works can be found concerning the addition of silicon carbide or graphite particles in PEO coatings, in order to improve the wear resistance on aluminium alloys. However, there is little knowledge regarding the improvement of wear resistance of PEO treated magnesium alloys. In this work, 3g/l of graphite nanoparticles were added to an electrolyte containing sodium phosphates and sodium silicates in order to improve the wear resistance of the coatings produced on AZ91 and AZ80 magnesium alloy. Treatments were conducted at high current densities and short treatment times (two different treatment times were tested). The thickness, the morphology and the composition of the coatings were studied with SEM-EDS and XRD. The wear resistance was analyzed with a tribometer and the corrosion resistance of the samples was studied with potentiodynamic polarization tests and EIS tests. The results showed that the graphite nanoparticles seal the pores that characterize the typical surface of a PEO treated magnesium alloy. This fact produced an improvement both in the corrosion resistance and in the wear resistance.

Biography

L Pezzato is at the third year of his PhD, and he works in the laboratory of metallurgy of the department of Industrial Engineering of the University of Padua. He mainly works on corrosion and coatings on light alloys. He has published about 10 papers in reputed journals.

lucapezzato@virgilio.it

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