Title: Plasma Electrolytic Oxidation of the Magnesium Alloy MA8 in Electrolytes Containing TiN Nanoparticles

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PII: S1005-0302(17)30029-4
DOI: http://dx.doi.org/doi:10.1016/j.jmst.2017.01.021
Reference: JMST 908

To appear in:

Received date: 21-9-2016
Revised date: 19-10-2016
Accepted date: 7-11-2016

Please cite this article as: D.V.Mashtalyar, S.V.Gnedenkov, S.L.Sinebryukhov, I.M.Imshinetskiy, A.V.Puz, Plasma Electrolytic Oxidation of the Magnesium Alloy MA8 in Electrolytes Containing TiN Nanoparticles, http://dx.doi.org/10.1016/j.jmst.2017.01.021

Plasma Electrolytic Oxidation of the Magnesium Alloy MA8 in Electrolytes Containing TiN Nanoparticles

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[Received 21 September 2016; Received in revised form 19 October 2016; Accepted 7 November 2016]

The formation of protective multifunctional coatings on magnesium alloy MA8 using plasma electrolytic oxidation (PEO) in an electrolytic system containing nanosized particles of titanium nitride was investigated. Electrochemical and mechanical properties of the obtained layers were examined. It was established that microhardness of the coating with the nanoparticle concentration of 3 g l^{-1} increased twofold (4.2 ± 0.5 GPa), while wear resistance decreased (4.97 × 10^{-6} mm^3 N^{-1} m^{-1}), as compared to respective values for the PEO-coating formed in the electrolyte without nanoparticles (2.1 ± 0.3 GPa, 1.12 × 10^{-5} mm^3 N^{-1} m^{-1}).

Key words: Magnesium alloys; Protective coatings; Plasma electrolytic oxidation; Corrosion; titanium nitride; Nanoparticles

1. Introduction

Recently, the fields of industrial application of magnesium (Mg) alloys have been significantly extended[1-4]. Aerospace industry has been the main consumer of Mg alloys for quite a long time. However, during the last decades, a serious competition for the fuel consumption reduction has