Effect of potassium permanganate on corrosion and wear properties of ceramic coatings manufactured on CP-aluminum by plasma electrolytic oxidation

F. Shamsi, M. Khorasanian, S.M. Lari Baghal

PII: S0257-8972(18)30411-0
DOI: doi:10.1016/j.surfcoat.2018.04.050
Reference: SCT 23334

To appear in: *Surface & Coatings Technology*

Received date: 11 December 2017
Revised date: 16 April 2018
Accepted date: 17 April 2018

Please cite this article as: F. Shamsi, M. Khorasanian, S.M. Lari Baghal , Effect of potassium permanganate on corrosion and wear properties of ceramic coatings manufactured on CP-aluminum by plasma electrolytic oxidation. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:10.1016/j.surfcoat.2018.04.050

Effect of potassium permanganate on corrosion and wear properties of ceramic coatings manufactured on CP-aluminum by plasma electrolytic oxidation

F.Shamsi, M.Khorasanian[1], S.M.lari baghal

Abstract

Ceramic coatings were produced on the surface of commercially pure (CP) aluminum using plasma electrolytic oxidation in electrolyte solutions containing potassium permanganate. Morphology, microstructure, chemical composition and microhardness of the coatings were studied in different conditions. The effects of potassium permanganate concentration on the corrosion and wear behavior of the coatings were also investigated. The phase analysis indicated that the ceramic coatings composed of Al_2O_3, MnO, Mn_3O_4, and Mn_2O_3 . Additions of potassium permanganate to the electrolyte lead to some new findings. The applied voltages and currents of the PEO process had lowered significantly. It had a beneficial in-situ sealing effect on the porous coatings. The corrosion and wear properties of the coatings were improved significantly by addition of potassium permanganate. Variation of the concentration of potassium permanganate changed the thickness and smoothness of the surfaces. Result indicated that formation of PEO coatings on pure aluminum has improved its corrosion resistance. Increasing the concentration of potassium permanganate resulted in high thickness and uniform microstructure coatings, caused the corrosion resistance of the samples to be increased. Creating a ceramic coating on the surface of pure aluminum increased its hardness and wear resistance and reduced the friction coefficient.

Keywords: potassium permanganate, plasma electrolytic oxidation (PEO), CP aluminum, corrosion, wear.

[1] **Corresponding author: m.khorasanian@scu.ac.ir**
Department of materials Science and Engineering,
Faculty of engineering,
Shahid Chamran University of Ahvaz
Islamic republic of Iran
Tel.: +98 61 33330010-19 office: 5739
Fax: +98 61 33336642