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V. Malinovschi, A. Marin, S. Moga, D. Negrea

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Preparation and characterization of anticorrosive layers deposited by micro-arc oxidation on low carbon steel

V. Malinovschi [a], A. Marin [b], S. Moga [a], D. Negrea [a,*]
[a] - *University of Pitesti, Targul din Vale, no.1, Arges, 110040, Romania*
[b]- *Institute of Physical Chemistry "Ilie Murgulescu" of the Romanian Academy, Spl. Independentei 202, Bucharest, 060021, Romania*

Abstract: Different types of composite layers containing aluminum oxide have been deposited by micro-arc anodic oxidation of carbon steel S235 JR, using an aqueous aluminate solution containing 7 g/l $NaAlO_2$ and 2 g/l NaOH.

The layers were analyzed by X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), microanalysis and salt spray tests.

The obtained layers contain aluminum oxide's polycrystalline phases (Al_2O_3–α and Al_2O_3–γ), are porous and have a thickness ranging from 3 to 11μm. It also has been observed that on increasing the layer thickness also increase the concentration of Al_2O_3–α polycrystalline phase and the occurrence time of red salt (rust). The anticorrosion properties of the deposited layers are limited because of their porosity.

* Corresponding author at: Research Center for Advanced Materials, University of Pitesti, Targul din Vale, No.1, Piteşti, Arge, 110040 ROMANIA. Tel: +4 0348 453 279; Fax: +4 0348 453 260;
E-mail adress: denis.negrea@upit.ro (D. Negrea).