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

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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 NaAlO₂ 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 (Al₂O₃- α and Al₂O₃- γ), are porous and have a thickness ranging from 3 to 11 μ m. It also has been observed that on increasing the layer thickness also increase the concentration of Al₂O₃- α polycrystalline phase and the occurrence time of red salt (rust). The anticorrosion properties of the deposited layers are limited because of their porosity.

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