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[THF-396] Synthesis and characterization of CeO2, La2O3 and codeposit thin films by RF magnetron sputtering on AA6082 aluminium alloy

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In spite of the high potential applications of rare earth thin films, only few studies have been made to prepare them by radio frequency magnetron sputtering as anticorrosive protector. In the present work, cerium and lanthanum oxide films were co-deposited by r.f. magnetron sputtering from a CeO2 and La2O3 target in an argon atmosphere (20 mTorr). The films were deposited onto Si(100), glass and AA6082 aluminum alloy substrates. Two different RFpowers were tested (60 and 90 watts) and for each power, the deposition time was changed from 25, 40 and 60 minutes, as well as the substrate temperature (ambient and 200°C). The structure, morphology and chemical composition was studied by X-ray Diffraction (XRD), X-ray Photoelectron Spectroscopy (XPS), and Scanning Electron Microscopy (SEM), respectively. The thickness of the thin films was obtained by ellipsometry spectroscopy. The protective character was evaluated on the aluminum alloy substrate by Open Circuit Potential (OCP), Polarization Resistant (Rp), Electrochemical Impedance Spectroscopy (EIS) and Potentiodynamic Polarization Curves. Electrochemical evaluated indicated that the rare earth films behave as cathodic inhibitors. The lanthanum oxide thin films are more protective as cerium oxide probably because is very reactive in contact of atmosphere, producing La(OH)3 with a corrosion velocity of 546.0 x 10-6 mpy (1.39 x 10-5 mmpy).
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