

## Effect of Micaceous Iron Oxide and Nanocrystalline Al on the Electrochemical Behavior of Aliphatic Amine Cured Epoxy Coating

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**Abstract :** Three coating formulations were fabricated by incorporating different percentages of MIO (micaceous iron oxide ) (1, 2, and wt%) with ball-milled nanocrystalline Al (2 wt%) particles, which was optimized earlier. These coatings were characterized by means of different methods, namely, SEM, TGA, pendulum hardness, scratch test, and nano-indentation. The EIS measurements were carried out to report the effect of adding MIO powder in fabricated coatings on their corrosion behavior in 3.5 wt% NaCl solutions. In order to report the effect of immersion time on the corrosion and degradation of the prepared coatings, the EIS data were also acquired after various exposure periods of time, i.e., 1 h, 7 d, 14 d, 21 d, and 30 d in the test chloride solution. It has been found that the obtained EIS data for the fabricated coatings proved that the presence of 2% MIO provided the highest corrosion resistance amongst all coatings and that effect was recorded after all immersion periods of time. But, the MIO-incorporated coatings have less corrosion resistance than Al based epoxy coatings. It was also shown that with prolonged immersion, the resistance to corrosion declined after 7d, then with a longer period of immersion, i.e. 14 d, 21 d, and 30 d increases the resistance to corrosion by forming oxide products on the coatings surface. The results obtained from both mechanical and electrochemical testing confirmed that the fabricated coating with 2 wt% Al exhibited better hardness and higher resistance to corrosion as compared to coatings with 1 wt% Al and 3 wt% Al.

**Keywords :** epoxy coatings, nanomaterials, corrosion resistance, EIS, nanoindentation

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