

ANISOTROPIC α -Fe₂O₃/CHITOSAN NANOCOMPOSITES BY ELECTROPHORETIC DEPOSITION

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Electrophoretic deposition (EPD) has been developed for the fabrication of composite coatings based on anisotropic hematite particles (α -Fe₂O₃) and chitosan (CHT) on stainless steel substrates for different technological applications ranging from coatings to sensors. The particles have been synthesized under refluxing conditions starting from a solution of FeCl₂ · 4H₂O and Poly-N-vinyl-pyrrolidone (PVP) in N, N-Dimethylformamide (DMF). A residual polymer content of around 10 percent by weight was found as part of the structure after the synthesis. Voltage 25 and deposition time of 5 min were selected as best deposition conditions which imply high homogeneous surface, non-delamination and good distribution of α -Fe₂O₃ particles. X-ray diffraction (XRD) measurements show the presence of hematite phase (α -Fe₂O₃). Thermogravimetric analysis (TGA) measurements were carried out to find the content of α -Fe₂O₃ and chitosan in the final coatings. According to this measurement, 60 and 35 percent were the final content. Scanning Electron Microscopy (SEM) images revealed the microstructure of the composite where it is possible to observe the deposition of anisotropic particles across the coating and cracks around them.