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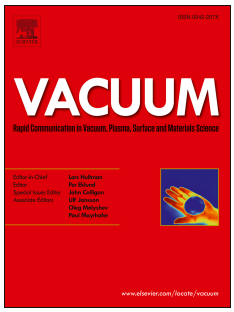

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Synthesis and Anticorrosive Performance Evaluation of Zinc Vanadate Pigment

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Abstract

Exclusion of chromate and lead based pigments and effective replacements of phosphate and molybdate are emergent demands in coating industry nowadays. In the present study zinc vanadate, the newest class of pigments, synthesized, characterized and evaluated for anticorrosive performance in coatings. The submicron size zinc vanadate pigment was synthesized by controlled coprecipitation reaction using zinc acetate as precursor and sodium metavanadate as the precipitant in presence of Polysorbate 80 (Tween-80) surfactant. The functional group, crystal structure and morphology of zinc vanadate were analyzed by FTIR, XRD, and FESEM respectively. Additionally, anticorrosive pigmentary properties of the synthesized pigment were evaluated using epoxy resin as a binder and polyamine as a curing agent as per ASTM and subsequently tested in artificial seawater (3.5 wt. % of NaCl). Superior performance in terms of anticorrosive protection with high tinting strength was exhibited by zinc vandate over their phosphate counterparts.

Keywords: zinc vanadate; controlled coprecipitation reactor; anticorrosive coatings; corrosion rate; etc.,

Although zinc and chromate based primers have been widely used in anticorrosion coatings, their use is restricted due to hazardous effects on the environment and health. During the past few years, vanadium oxides based materials have attracted much attention due to their fascinating structures leading to enhanced electronic, optical and magnetic properties, which are relevant to such diverse areas as lubrication, chemical sensor, catalysis, cathode materials in batteries, minerals and corrosion inhibitors [1-6]. Inspired by those applications, much work has been directed on the synthesis and characterization of various vanadium compounds such as LiV_3O_8 [7], CuV_2O_6 [8], Bismuth vanadate [9] and zinc vanadates [10-11]. The active inhibitive species in molybdate and phosphate pigments is the molybdate/phosphate anion which is thought to repassivate the corrosion pits in steel [12]. It is also assumed that environmental friendly zinc vanadate has anticorrosive properties when employed in anticorrosive paints for metals. As a result, zinc vanadate can be thought as a good substitute over the chromate based pigments used in anticorrosive coatings. The variety of methods have been employed for synthesis of zinc vanadates such as microwave [13], sol–gel method