World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:12, No:04, 2018

Application of Stabilized Polyaniline Microparticles for Better Protective Ability of Zinc Coatings

Authors : N. Boshkova, K. Kamburova, N. Tabakova, N. Boshkov, Ts. Radeva

Abstract : Coatings based on polyaniline (PANI) can improve the resistance of steel against corrosion. In this work, the preparation of stable suspensions of colloidal PANI-SiO₂particles, suitable for obtaining of composite anticorrosive coating on steel, is described. Electrokinetic data as a function of pH are presented, showing that the zeta potentials of the PANI-SiO₂ particles are governed primarily by the charged groups at the silica oxide surface. Electrosteric stabilization of the PANI-SiO₂ particles’ suspension against aggregation is realized at pH>5.5 (EB form of PANI) by adsorption of positively charged polyelectrolyte molecules onto negatively charged PANI-SiO₂ particles. The PANI-SiO₂ particles are incorporated by electrodeposition into the metal matrix of zinc in order to obtain composite (hybrid) coatings. The latter are aimed to ensure sacrificial protection of steel mainly in aggressive media leading to local corrosion damages. The surface morphology of the composite zinc coatings is investigated with SEM. The influence of PANI-SiO₂ particles on the cathodic and anodic processes occurring in the starting electrolyte for obtaining of the coatings is followed with cyclic voltammetry. The electrochemical and corrosion behavior is evaluated with potentiodynamic polarization curves and polarization resistance measurements. The beneficial effect of the stabilized PANI-SiO₂ particles for the increased protective ability of the composites is commented and discussed.

Keywords : corrosion, polyaniline-silica particles, zinc, protective ability
Conference Title : ICEMC 2018 : International Conference on Electrochemical Methods in Corrosion
Conference Location : Venice, Italy
Conference Dates : April 12-13, 2018