Short Communication

Corrosion Inhibition of Aluminum in Hydrochloric acid Solution Using Ceria Doped Polyvinyl Chloride Nanofiber.

Soha Gaballah^{1, 2, *}, Nader Shehata^{1, 3, 4}, Mohamed Shaaban², Shaaban Nosier², Ahmed Hefnawy⁵, Aya Hamed^{1, 4}, Effat Samir^{1, 6}

¹ Center of Smart Nanotechnology and Photonics (CSNP), SmartCI Research Center, Alexandria University, Alexandria 21544 Egypt.

² Department of Chemical Engineering, Faculty of Engineering, Alexandria University, Alexandria 21544 Egypt.

³ USTAR Bioinnovations center, Utah State University, Logan 84341 Utah

⁴ Department of Engineering Mathematics and Physics, Faculty of Engineering, Alexandria University, Alexandria 21544 Egypt.

⁵ Department of Materials Science t, Institute of Graduate Studies and Research, Alexandria University, Alexandria, 21544 Egypt

⁶ Department of Electrical Engineering, Faculty of Engineering, Alexandria University, Alexandria 21544, Egypt

*E-mail: soha_gaballah@mena.vt.edu

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This aim of the percent work is to develop new, cost effective, high performance, lightweight polymer matrix composite nanofiber for corrosion resistance of aluminum in 0.1 M hydrochloric acid (0.1 M HCl) solution. Cerium oxide nanoparticles (ceria NPs) are embedded *in-situ* in *poly vinyl chloride* (PVC) solution, and then formed as nanofibers using electrospinning technique. The formed nanocomposite coating of PVC is successfully deposited on aluminum substrates; considering these substrates as metallic target in the electrospinning procedure. Measurements of corrosion for aluminum substrate before, and after coating with polymer nanofiber in 0.1 M HCl solution is performed using potentiodynamic polarization ,and electrochemical impedance spectroscopy techniques. Potentiodynamic polarization and electrochemical impedance results confirm that ceria NPS embedded *in-situ* within PVC NFS coatings protect the aluminum surface from being corroded through minimizing both of its corrosion rate, corrosion current and increasing the surfaces' polarization resistance. The morphologies of polymer nanofiber coatings are imaged using scanning electron microscopy (SEM), with detecting the optical characteristics of the synthesized nanocomposite to prove the existence of oxygen vacancies associated to tri-valent cerium ions via optical analysis such as direct band gap, and fluorescence measurements. These vacancies are considered physical adsorbers for radicals which consequently reduces the corrosion rate. Average mean diameter of ceria NPS was measured using transmission electron microscopy (TEM).

Keywords: aluminum corrosion, polyvinyl chloride (PVC), nanofiber coating, ceria nanoparticles, corrosion resistance.

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