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Evaluation of anticorrosive potential of nanoparticles of bioproducts in microemulsion systems

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The present work used bioproduct nanoparticles as a microemulsioned O/W solution system component. The biomaterial used as a corrosive agent was obtained from the *Litopenaeusvannamei* shimp shell solution. The bioproduct used in this study was derived from the chitin, the second most available polysaccharide in nature. The chitin is biodegradable, abundant, and it is available at low cost. A phase diagram formed by Renex NP 110 (surfactant-S), 1-butan-ol (cosurfactant-C), kerosene (oil phase-OP), and bioproduct water solution (aqueous phase-AP), in a fixed C/S ratio equal to 1. Three points in MES were chosen within the microemulsioned region (Winsor IV). Point 1 with 85% AP, 13.5% C/S, and 1.5% OP; point 2 with 80% AP; 18.5% C/S, and 1.5% OP; and point 3 had 78.5% AP, 20% C/S, and 1.5% OP. Points 1, 2, and 3 were characterized by particle size, surface tension, temperature, and pH to determine the behavior within each point and its interactions. Following the characterization, the points were tested as corrosion inhibitors in AISI 1020 steel in a NaCl 3.5% medium. The inhibition efficiencies found in this study was above 90% and were similar for the 3 points studied. Therefore, the presence of SME bioproduct is an effective tool in combating the corrosion of steel AISI 1020.

Biography

Rossi C. G. F. T holds a bachelor's, master's, and doctorate degrees in Chemistry from Federal University of Rio Grande do Norte (2001). Her areas of concentration are: aminoacid-based surfactants, micoemulsions, corrosion innhibitors, solubilization of petroleum fractions and bore, advanced oil recovery. She has a Ph.D. in Petroleum Engineering from NUPRAR (núcleo de processamento primário e reúso de água produzida e resíduos) and a Ph.D. in Chemical and Petroleum Engineeringfrom PNPD (Programa Nacional de Pós Doutorado da Capes). On the side, she works with chemistry of interfaces to obtain nanoformulations applied to natural products, with biotechnological applications.

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Nanoscale characterization of Cu-Zn-Al shape memory alloy synthesized through electrodeposition-annealing route

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Shape memory alloys (SMAs) classified as smart materials has since been utilized for various technological, medical, industrial, and structural applications such as actuators, couplings, orthodontics and medical guide wires, aeronautical and space structures, among others. These functional intermetallics manifest two unique properties, "shape memory" behavior and pseudoelasticity.

In this research, an atomic level of characterization was employed in the synthesized Cu-Zn-Al shape memory alloy (SMA), which was developed through electrodeposition of brass on aluminum substrate with average bulk composition in at % of Cu-18.35Zn- 39.58Al and was subsequently annealed over an increasing temperature range of 300 to 500^{0}C with dwell time of 5 hours under flowing nitrogen ambient. Microstructures and compositional analysis of the fabricated alloy were investigated under scanning electron microscopy (SEM)-energy dispersive spectroscopy (EDS) technique. Whereas, the X-ray diffraction patterns yielded peaks consistent with the presence of binary phase of Cu_5Zn_8 and ternary SMA phases of Cu-Zn-Al including martensite variant of M18R. These martensitic phases are attributed to the shape memory behavior observed in the alloyed and quenched strips. The characterization techniques achieved the claim that shape memory phases were actually produced in the microstructure.

Biography

Emma L. Almadrones has completed her master's degree in Materials Science and Engineering (2010) and bachelor's degree in Chemical Engineering (2004) both attended at the University of the Philippines, Diliman. Currently, she is working as a process control engineer at Marami Metal Plating LLC in Dubai, United Arab Emirates.

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