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Corrosion behavior of marine in steels black sea water protected with modified polymeric coating by addition of TiO_2 nanoparticles

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Many engineered structures have a limited life span and are deteriorated because of the loss of material properties, exposure to severe environments or increases in service loads. Carbon steel is one of the most widely used materials in the ship and offshore structure industry. Corrosion and corrosion-related problems are considered to be the most important factors leading to age-related structural degradation of ships and many other types of steel structures. Corrosion considered as the most important factor leads to the structural degradation of ships and other types of steel structures intended for work in the marine environment. Corrosion of carbon steel in marine environment becomes serious due to the highly corrosive nature of seawater with high salinity and microorganisms. Various organic and inorganic coatings are used to protect metallic materials particularly steel against corrosion occurrence. The most used are the polymeric protective coatings. The nanostructured TiO2 polymer coating is able to offer higher protection to steel against corrosion and performed relatively better than other polymer coatings. The aim of the paper is to show the role of TiO2 nanoparticles in the enhancement of protective coatings and the lifespan of marine structures. The novelty of this research consist of the comparative assessment of corrosion resistance of different types of surfaces: E32 low alloy steel without protective coating, E32 coated with polymeric primer and E32 steel coated with polymeric primer mixed with TiO_2 nanoparticles. All samples were subjected to corrosion in sea water collected from the Black Sea, Năvodari Oil Terminal. The corrosion properties have been studied by electrochemical methods. The purpose is to improve the protection capabilities of polymeric coatings by adding dispersed inert ceramic nanoparticles as titanium oxide with an average diameter of 200 nanometers.

Recent Publications

1. Mardare L and Benea L (2017) Development of anticorrosive polymer nanocomposite coating for corrosion protection in marine environment. Materials Science and Engineering 209:012056.
2. Lidia Benea, Laurentiu Mardare and Nicoleta Simionescu (2018) Anticorrosion performances of modified polymeric coatings on E32 naval steel in sea water. Progress in Organic Coatings 123:120-127.
3. Mardare L, Benea L, Danaila E and Dumitrascu V (2015) Polymeric coatings used against marine corrosion of naval steel en32. Key Engineering Materials 699:71-79.

Biography

Laurentiu Mardare has five years of working research experience within the Doctoral School, Fundamental and Engineering Sciences, Faculty of Engineering at Dunarea de Jos University of Galati. He is specialized in engineering of integrated manufacturing systems. He handled externally funded and institute projects and published more than 10 international and national research papers. He is now working as an engineer at Oriana Engineering Project ltd, Galati, Romania.

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