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Mini Review

A Short Review of Antifouling Paint Performance in Tropical Seawater of Indonesia

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Abstract

Antifouling paint was used on a broad range of the seawater static and dynamic structures in order to minimize it from the growth of destructive fouling organisms. In Indonesia, most scientific investigations elucidated that there is no attached fouling took place on the surface of antifouling coated steel, whereas uncoated steel were covered by dense fouling organisms during application.

Keywords: Antifouling paint; Biofouling; Corrosion; Seawater; Biocide

Introduction

Seawater is a complex solution of organic, inorganic, and biological components. These can affect with materials especially alloys and metals to cause corrosion and to degrade their properties. Marine biofouling appears to be one of the major problems found in surfaces exposed to such an environment and it is defined as the undesirable accumulation of organisms on surfaces immersed in sea water [1]. This biological process induces inconvenient effects on ships such as raising the frictional resistance, increasing the frequency of dry-docking operations, the deterioration of the corrosion protection system, and the introduction of non-native species into a given environment [2]. Marine biofouling on many static structures may compromise safety by reducing stability and concealing structural defects [3].

Furthermore, generally, the tropical environments caused considerably higher corrosion attack in various metals than comparable temperate climate exposures. In Indonesia representative of tropical country, Sundjono et al. [4] have investigated the destructive corrosion behavior of mild steel in seawater from Jakarta and Bali regions. In addition, Marine biofouling also contributes to reduce the performance of structure in tropical offshore area. The effect of seawater parameters such as pH, dissolved salts, dissolved oxygen, temperature and salinity on biofouling will also contribute an essential role of growing the fouling organism [1]. Nowadays, the use of antifouling paints is the most economical and satisfactory method to protect submerged static and dynamic structures from attached biofouling. Mostly, antifouling paints contain certain biocide pigments against the fouling organisms in their formulation. The limitation on tributyltin (TBT) compounds usage in antifouling paints 2008, copper (Cu) is applied as an alternative primary biocide ingredient in antifouling paint. However, the release mechanism of these pigments can vary with the type of paint matrix. There are three types of matrix: soluble, insoluble and self-polishing [5]. In Indonesia, currently, all antifouling paints are categorized as self-polishing copolymer antifouling paints with active biocide of cuprous oxide (Cu_2O). Copper exhibits antifouling activity against organisms such as barnacles, tube worms and the majority of alga fouling species [6]. Several researchers from Indonesian Institute of Sciences (IIS) had investigated the performance of antifouling paints which related to both physical and chemical properties of tropical seawater in Java and Bali Regions, Indonesia. The evaluation of the performance for both anticorrosion and antifouling paints in the piles of Suramadu Bridge, East Java, Indonesia during 1-month exposure revealed that both surfaces of anticorrosion paint and bare mild steel covered by dense fouling organisms, whereas no fouling took place on the surface of antifouling paint [7] as well as in static structure of Muara Baru, Jakarta. Moreover, the fouling process has been considered from the initial attachment of microfouling (bacterial colony) organisms to macrofouling organisms on subtract of mild steel. Researcher from IIS had been elucidated that different species from the genus Vibrio identified as V. alginolyticus and V. natriegens were responsible for biofouling in seawaters of Jakarta Bay and Madura Strait, Indonesia [8]. Biological and chemical components of seawaters might affect settlement pattern of bacterial biofoulers. Therefore, those microorganisms contribute to initiate the destruction of static structure in tropical seawater.

Conclusion

There is no attached biofouling took place on the surface of antifouling coated steel, whereas uncoated steel were covered by dense fouling organisms during exposure in seawater of tropical regions. The utilization of antifouling paints is the most economical and effective way to protect submerged static and dynamic structures from destructive attached biofouling in Indonesia.

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