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Improvement of Resistance Features of Anti- Mic Polyaspartic Coating (DTM) Using Nano Silver Particles by Preventing Biofilm Formation

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Abstract : Microbiologically influenced corrosion (MIC) is an electrochemical process that can affect both metals and non-metals. The cost of MIC can amount to 40% of the cost of corrosion. MIC is enhanced via factors such as but not limited to the presence of certain bacteria and archaea as well as mechanisms such as external electron transfer. There are five methods by which electrochemical corrosion, including MIC, can be prevented, of which coatings are an effective method due to blinding anode, cathode and, electrolyte from each other. Conventional ordinary coatings may themselves become nutrient sources for the bacteria and therefore show low efficiency in dealing with MIC. Recently our works on polyaspartic coating (DTM) have shown promising results, therefore nominating DTM as the most appropriate coating material to manage both MIC and general electrochemical corrosion very efficiently. Nanosilver particles are known for their antimicrobial properties that make them of desirable distractive impacts on any germs. This coating will be formulated based on Nanosilver phosphate and copper II oxide in the resin network and co-reactant. The nanoparticles are light and heat-sensitive agents. The method which is used to keep nanoparticles in the film coating is the encapsulation of active ingredients. By this method, it will prevent incompatibility between different particles. For producing microcapsules, the interfacial cross-linking method will be used. This is achieved by adding an active ingredient to an aqueous solution of the cross-linkable polymer. In this paper, we will first explain the role of coating materials in controlling and preventing electrochemical corrosion. We will explain MIC and some of its fundamental principles, such as bacteria establishment (biofilm) and the role they play in enhancing corrosion via mechanisms such as the establishment of differential aeration cells. Later we will explain features of DTM coatings that highly contribute to preventing biofilm formation and thus microbial corrosion.

Keywords : biofilm, corrosion, microbiologically influenced corrosion(MIC), nanosilver particles, polyaspartic coating (DTM)
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