

セルロースナノファイバーの自己修復性 防食コーティングへの応用

Application of Cellulose Nanofibers to Self-healing Corrosion Protective Coatings

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Abstract

Anti-corrosion protective coatings have been widely applied as a surface treatment to prevent corrosion of various metallic materials. One of the most important characteristics of these coatings is the ability to self-heal. If a self-healing coating suffers mechanical damage and corrosive species in the environment begin to degrade the bare metal surface, the damaged surface is automatically repaired by a chemical component of the coating. Chromate conversion coatings have self-healing properties. However, environmental concerns have necessitated the reduction and discontinuation of chromate-based protective coatings in recent years. In this manuscript, firstly corrosion and corrosion protection are briefly described. Next, the properties of various anti-corrosion coatings, the concept of self-healing coatings, and nanomaterials for self-healing coating are explained. Then, the use of nanofiber as one of the nanomaterials on self-healing is explained as follows. The network structure by nanofibers in a coating system not only provides a container for inhibitors but also provides channels and pathways for release of corrosion inhibitor. The performance of the self-healing coating with nanofibers is determined by the successful release of the corrosion inhibitor. The controlled release of corrosion inhibitors by pH change in nanofibers was enhanced the performance of self-healing coatings. Finally, self-healing multi-layer coatings with cellulose nanofibers and synergistic corrosion inhibitors is explained.

キーワード：自己修復、ナノファイバー、コーティング、腐食、ポリマー

Keywords : Self-healing, Nanofiber, Coating, Corrosion, Polymer

1. はじめに

建物や自動車などに用いられる金属の表面を環境から守り、美しい外観を保つために各種のコーティングがなされる。コーティングの目的

の一つは金属の腐食を防止することである。防食のためのコーティングでは、通常は顔料を混合させて、水分や酸素の遮断性を高めたり、ハードコーティングにより機械的作用による傷の防止を図る。ところが、このような処理を行っていても、設計値以上の機械的あるいは化学的な外力が働き、金属素地に達する傷が生じると、金属が環境にさらされ、腐食が生じてしまう。この腐食反応が自然に止まる機能を持つ

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