

Visible Light Sensitive Photocatalyst added Water Repellent and Antibacterial Coating Material

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Abstract

The effect of adding N-doped TiO₂ into the water repellent material on the antibacterial properties was investigated aiming for developing the water repellent and antibacterial coating material to be used in both indoor and outdoor circumstances. Contact angle of water on the N-doped TiO₂ added material was 151 degree showing the hydrophobic property in spite of the existence of hydrophilic N-doped TiO₂. The visible light sensitive photocatalytic property was detected by decomposition of methylene blue by visible light radiation. The antibacterial property was demonstrated by the reduction of colon bacilli by visible light radiation. These results show this material has potential ability to be applied in both indoor and outdoor circumstances which need water repellency and antibacterial property.

Keywords: Water Repellent, Antibacterial Property, Visible Light Sensitive, Photocatalyst

1. Introduction

The polytetra-fluoroethylene (PTFE) particle dispersed water repellent coating material was developed with application to snow sticking free communication antenna in snowy area in Japan¹⁻⁵⁾. This coating material is composed of PTFE particles, fluoro-oil and fluorine binder. To prevent the sticking of hydrophilic contamination on the antenna surface, Anatase type TiO₂ that decomposes the contamination by the photocatalytic reaction, was added to the PTFE particle

dispersed water repellent coating material, which results in saving the water repellency⁶⁻⁷⁾. Unfortunately this photocatalytic reaction occurs only in the presence of ultraviolet ray, or in the outdoor circumstances. Therefore application of this material is limited only to the outdoor used components. By substituting N-doped TiO₂, visible light sensitive photocatalyst, for anatase type TiO₂, the water repellent and contamination free material is potentially applied to both outdoor and indoor components. In this paper, special attention is poured upon the antibacterial property of the coating.

2. Theory

The water repellent property of PTFE dispersed coating material with more than 150

要 旨

可視光応答型光触媒を添加した超撥水・抗菌材料

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屋外屋内を問わず使用できる超撥水・抗菌材料を開発するため、可視光応答型光触媒である窒素ドーブ TiO_2 を添加した PTFE 分散型超撥水材料を作製し、表面特性、可視光下での防汚活性、抗菌性を評価し、この材料の適用領域拡大の手掛かりを得ることを目的とした。

この材料においては、親水性の窒素ドーブ TiO_2 を添加したにも係わらず接触角151度の超撥水性を示し、可視光照射による防汚性、大腸菌に対する抗菌性を実証した。これらの結果から、本材料が、屋外のみならず屋内においても超撥水性と抗菌性が必要とされる分野に応用が可能であることが明らかとなった。

キーワード：超撥水性、抗菌性、可視光応答型、光触媒