

Rutile titanium dioxide photocatalyst

Titanium dioxide thin film excellent in photocatalytic performance and hydrophilicity can be produced at low cost and convenience

概要

Practical titanium dioxide photocatalysts often use powder as a raw material, and immobilization and adhesion to substrates have been problems for industrial use. Moreover, although titanium dioxide is active in ultraviolet light, its lack of activity in natural light such as sunlight has been a long-standing problem.

The present invention relates to a technique for producing a rutile-type titanium dioxide thin film using an anodization method, which enables the creation of a thin film with high adhesion ability that combines photocatalytic performance and superhydrophilicity at a relatively low cost (right table). The thin film exhibits photocatalytic activity not only in ultraviolet light but also in visible light (Figure 1). In addition, water droplets are completely wetted and spread on the surface of the thin film after 0.005 seconds under visible light as well as ultraviolet irradiation, confirming the high speed wettability equivalent to that of "ink jet printer paper with excellent permeability" (Figure 2).

応用例

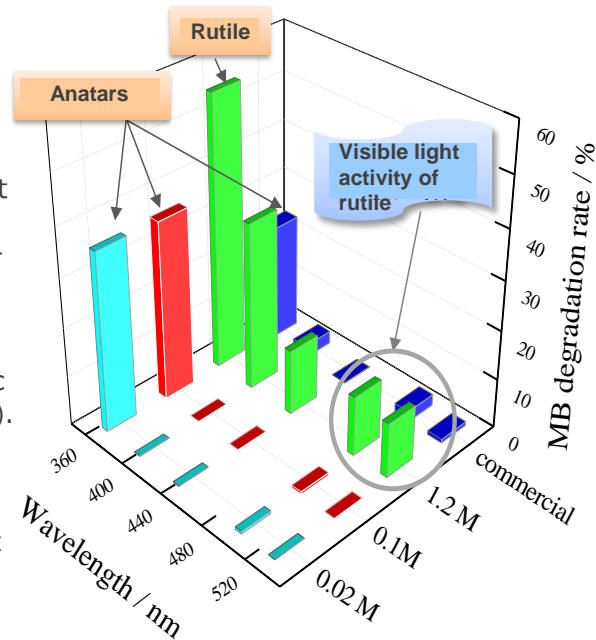
- Air purifiers, water purifiers, medical equipment, sanitary equipment, tableware and cooking equipment, and biocompatible materials
- Building exterior materials (Exterior walls, glass), interior materials (wallpaper), etc.

知的財産データ

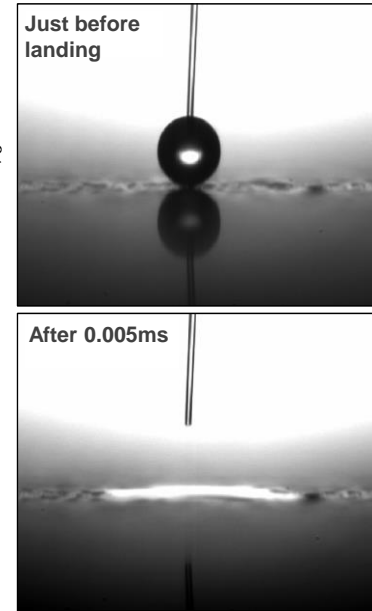
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[Table] Comparison of the Characteristics of Titanium Dioxide Fabricated by the Anodic Oxidation Method with Conventional Materials (Fabricated by the Sol-Gel Method)

Method of manufacturing	Main phase	Color	Photocatalytic performance		Superhydrophilicity	Adhesion force
			Ultraviolet light	Visible light		
Solgel method	Anatase	Transparency	○	○	△	×
Anodic oxidation	Conventional method	Anatase	△	△	△	△
	Present invention	Rutile	○	○	○	○



[Fig. 1] MB degradation rate by irradiation of various wavelengths of light for each sample: rutile type (green bar graph) shows higher activity than anatase type for both ultraviolet and visible light wavelengths



[Fig. 2] CCD Image after Droplet Drop on Anodic Oxide Film under Fluorescent Light: It is possible to observe the rapid wetting and spreading of water droplets.

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