

## 초청강연1

### New Field in Photoelectrochemistry: Photocatalytic, Super-hydrophilic and Super-hydrophobic Functions of TiO<sub>2</sub> Coatings.

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Titanium dioxide is known to be an outstanding photocatalytic material for environmental purification, due to its strong oxidizing power. In the recent past, we have demonstrated various applications of this material in practical conditions [1]. Recently, we have found that UV illumination of TiO<sub>2</sub> materials changes its surface to highly amphiphilic one with a water contact angle of nearly 0 degree [2, 3]. The production of such an unique surface is attributed to the formation of a microstructured distribution of hydrophilic and oleophilic phases [2]. We have shown that the hydrophilic sites are due to the photoreduction of Ti<sup>4+</sup> sites to Ti<sup>3+</sup> state based on the results from X-ray photoelectron spectroscopy (XPS) as well as from the contact angle measurements. We have also shown various applications of the TiO<sub>2</sub> coated substrates such as self-cleaning building material, anti-fogging glass, etc. Very recently, we have also succeeded in developing a super hydrophobic coating with a water contact angle of more than 160 degree [4]. This film is made of either boehmite or silica with fluoro-alkyl silane coating. In addition, the water sliding angle of less than 1 degree for 7 mg of water droplet was achieved by designing the surface structure of the film. Moreover, by adding a very small amount of TiO<sub>2</sub> (only 2 wt %) to the boehmite (or silica) film, the superhydrophilic surface attained a self-cleaning effect due to the photocatalytic reactions of TiO<sub>2</sub>. The application of the superhydrophobic film will also be presented.

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[4] "Preparation of Transparent Super-hydrophobic Boehmite and Silica Films by Sublimation of Aluminum Acetylacetonate" A.Nakajima, A.Fujishima, K.Hashimoto, and T.Watanabe, *Adv. Mater.*, in press.