

Surface modification of TiO₂ by atmospheric pressure plasma

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To improve surface wettability, each sample was treated by atmospheric pressure plasma (APP) using dielectric barrier discharge (DBD) system. Argon and oxygen gases were used for treatment gas to modify the TiO₂ surface by APP with RF power range from 50 to 200 W. Water contact angle was decreased from 20° to 10° with argon only. However, water contact angle was decreased from 20° to <1° with mixture of argon and oxygen. Water contact angle with O₂ plasma was lower than water contact angle with Ar plasma at the same RF power. It seems to be increasing the polar force of TiO₂ surface. Also, analysis result of X-ray photoelectron spectra (XPS) shows the increase of intensity of O1s shoulder peak, resulting in increasing of surface wettability by APP. Moreover, each water contact angle increased according to increase past time. However, contact angle increase with plasma treatment was lower than without plasma treatment. Additionally, the efficiency of TiO₂ photocatalyst was improved by plasma surface-treatment through the degradation experiment of phenol