

Change in the photocatalytic activity of TiO₂ depending on the surface structure

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Behaviors of TiO₂-based photocatalysts with different surface structures on the removal of gas-phase toluene with and without UV irradiation are reported. P-25(Degussa) TiO₂ powder dispersed in distilled water by sonication was deposited on the transparent glasses and then dried. Some of the samples were further annealed in oven for 1 hr. These samples obtained before and after annealing were characterized by Brunauer- Emmett-Teller (BET), Transmission Electron Microscope (TEM), X-ray Photoelectron Spectroscopy (XPS) and Fourier Transform Infrared (FT-IR) spectrometry, respectively. Based on BET and TEM data, no significant structural change upon annealing could be identified. However, the sample without annealing showed a significantly higher ability for removing toluene both in the presence and absence of the UV light. XPS and FT-IR results clearly revealed that the population of the OH groups on the surface of TiO₂ was higher for the sample without annealing, indicating that the OH groups can enhance the adsorption capacity and photocatalytic activity of TiO₂ for the removal of the gas-phase toluene.