

Photocatalytic Efficiency of TiO₂ Thin Films at Solid-Solid Interface

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Recently the photocatalytic efficiency of TiO₂ at solid-solid interface has caused increasing interest due to its potential applications, yet limited study has been conducted and very little knowledge is recognized for this discipline. Unlike the organics in liquid or gas phase, which are free to transport and absorb onto TiO₂ particle surface, the contaminants in solid phase move in a much slower manner. This may lead to a prolonged degradation process since one of the parameters that control the reaction rate is the effectiveness of contact between TiO₂ and the degradable compounds. Parameters such as TiO₂ grain size, porosity of aggregates and reactive surface area will influence the degradation rate. Structural features may also change during the photocatalytic

degradation process. In both cases Surface roughness quantification down to the atomic scale range of a few angstroms is needed.

Small angle x-ray scattering (SAXS) is used to investigate the fractal structure of TiO₂ films. The fractal dimension f_d and radius of gyration R_g can be determined from a plot of $\log(I)$ versus $\log(Q)$, where I is the intensity and Q is the scattering vector. The structure of TiO₂ film at different stages of degradation process are characterised by these parameters. The changes will give insight into the key factors that contribute to the degradation at solid-solid contact mode.