

## Thickness dependent photocatalytic activity of $\text{TiO}_2/\text{Fe}_2\text{O}_3$ and $\text{FeTiO}_3$ thin films

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Photocatalysts have been widely studied and applied in the environment, deodorant, energy, air purification, surface self-cleaning, etc.. Since the illuminated decomposition of water into  $\text{H}_2$  and  $\text{O}_2$  was found by Fujishma and Honda, extensive studies have been done for photocatalytic properties of  $\text{TiO}_2$  films. There have been committing to a variety of possible methods to enhance the efficiency of  $\text{TiO}_2$  films.

According to previous researches: photocatalytic activity of  $\text{TiO}_2$  anatase phase was better but only used in UV-light region. Hematite ( $\alpha\text{-Fe}_2\text{O}_3$ ) and ilmenite ( $\text{FeTiO}_3$ ) can be applied in the Vis-light range, but their photocatalytic activity is poorer than  $\text{TiO}_2$ . In this study, we want to prepare  $\text{TiO}_2$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{FeTiO}_3$ , and  $\text{TiO}_2/\text{Fe}_2\text{O}_3$  films with different thicknesses; then we would investigate and compare the photocatalytic efficiency of these films.

The  $\text{TiO}_2$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{FeTiO}_3$ , and  $\text{TiO}_2/\text{Fe}_2\text{O}_3$  films were deposited on Si(100) substrates by R.F. magnetron sputtering system. The surface composition and chemical state of films were examined by X-ray photoelectron spectroscopy (XPS). The topography of these films was observed by an atomic force microscope (AFM). The band gap of all the films was measured by solid UV-Vis spectroscope. Moreover, the photodegradation of Methylene blue (M.B.) was investigated by liquid UV-Vis spectroscope. The photocatalytic activity and mechanism of these films dependent on film thickness would be also discussed.

Keywords: Thin film,  $\text{TiO}_2$ ,  $\text{Fe}_2\text{O}_3$ ,  $\text{FeTiO}_3$ ,  $\text{TiO}_2/\text{Fe}_2\text{O}_3$ , photocatalysis.