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S-doped TiO_2 films applied to UV-Vis heterogeneous photocatalysis

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Semiconductors materials such as titanium dioxide (TiO_2) have been applied successfully on photocatalytic process for water treatment [1]. Sulfur doping allows the reduction of the TiO_2 band gap energy, and changes the absorption edge from the UV to the visible light region, thus obtaining a higher photocatalytic activity [2]. The aim of this research was to study the photocatalytic behavior of sulfur-doped and undoped TiO_2 films in the methyl orange dye degradation under UV and visible radiation. The titanium dioxide films were grown on borosilicate substrates, by metalorganic chemical vapor deposition (MOCVD) technique at 400 °C. The doping step was done in a tubular furnace under H_2/2 wt.% H_2S atmosphere at 50 °C, 100 °C and 150 °C for 60 minutes. All the films presented on their surfaces the formation of well-defined rounded grains. X-ray diffraction analyses shown that S-TiO_2 and TiO_2 films exhibited the formation of anatase phase, which suggests that the doping process do not causes meaningful changes in the structure of TiO_2 films. MO dye degradation tests indicated that the S-TiO_2 films present photocatalytic activity both under UV radiation and visible light. S-TiO_2 film doped at 50 °C presented the higher photocatalytic performance, and exhibited 72.1 % of MO dye degradation for a total test time of 300 minutes under visible light. Undoped TiO_2 film demonstrated photoactivity only under UV light, with an efficiency of 63.5 %. The photolysis curve showed that without the presence of the catalyst there was no degradation of the dye under both UV radiation and visible light. The results suggest that the sulfur doping caused a shift of the TiO_2 absorption edge to the visible region, which allows their practical application under sunlight or visible light bulbs.

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References:

[1] O. Sacco et al., Journal of Cleaner Production 175, 38-49 (2018).
[2] F. Wang et al., Electronic Materials Letters 12, 530-536 (2016).