

Photocatalytic degradation of methylene blue by the Anderson-type polyoxomolybdates/TiO₂ thin films

Diaz-Urbe C.E.

Rodríguez A.

Utria D.

Vallejo W.

Puello E.

Zarate X.

Schott E.

In the herein work, two Anderson-type polyoxomolybdates (containing Cu and Zn, respectively) were synthesized and deposited on TiO₂ thin films. The properties of the films were studied through measurements of inductively coupled plasma optical emission spectrometry (ICP), Fourier transform infrared spectroscopy (FT-IR) and absorption diffuse reflectance. The photodegradation of methylene blue (MB) was studied under UV-irradiated on TiO₂ and polyoxomolybdates/TiO₂ thin films in aqueous solution. Langmuir-Hinshelwood model was used to obtain kinetic information of the photocatalytic process. Results showed that the polyoxomolybdates/TiO₂ photocatalytic activity is improved with respect to the TiO₂ pure. The highlighted result was reached when copper polyoxomolybdates/TiO₂ film was employed and the efficiency in the MB photodegradation improved from 18.8% to 40%. Furthermore, DFT and TD-DFT quantum mechanics calculations were used to characterize the geometry and electronic structure of the compounds and to give a rational explanation to the measured photocatalytic activity. © 2018 Elsevier Ltd

DFT

Heterogeneous photocatalysis

Polyoxometalate

Thin films

TiO₂

