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**Photoelectrocatalytic degradation of oxalic acid using WO<sub>3</sub> and stratified  
WO<sub>3</sub>/TiO<sub>2</sub> photocatalysts under sunlight illumination**

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**Abstract**

The WO<sub>3</sub> and stratified WO<sub>3</sub>/TiO<sub>2</sub> thin films are successfully prepared by the spray pyrolysis method. The structural, morphological, compositional and photoelectrocatalytic properties of WO<sub>3</sub> and stratified WO<sub>3</sub>/TiO<sub>2</sub> thin films are studied. XRD analysis confirms that films are polycrystalline with monoclinic and tetragonal crystal structures for WO<sub>3</sub> and TiO<sub>2</sub> respectively. The SEM images clearly show 3D sheeted porous structure of the as-prepared TiO<sub>2</sub> forms on WO<sub>3</sub> in stratified WO<sub>3</sub>/TiO<sub>2</sub> samples. The synthesized photoelectrodes was used as catalyst for photoelectrocatalytic degradation of oxalic acid in aqueous medium. The rate constant (k) was evaluated as a function of the initial concentration of species. A significant decrease in concentrations of organic species was observed from COD analysis. The photoelectrocatalytic degradation effect is relatively higher in the case of the stratified WO<sub>3</sub>/TiO<sub>2</sub> than WO<sub>3</sub> thin film photoelectrode in the degradation of oxalic acid and 83 % removal efficiency of oxalic acid is obtained after 180 min. Based on the obtained experimental data, the possible photoelectrocatalytic reaction mechanism was proposed. The photoelectrocatalytic experimental results indicate that stratified WO<sub>3</sub>/TiO<sub>2</sub> photoelectrode is the promising material for removing of water pollutants.

**Keywords:** Stratified WO<sub>3</sub>/TiO<sub>2</sub> thin film, Oxalic acid (OA), Chemical oxygen demand (COD)

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