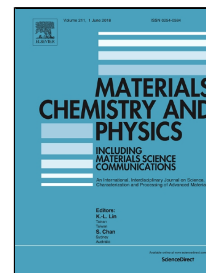


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Fabrication of Al₂O₃ Nanopores/SnO₂ and its application in photocatalytic degradation under UV irradiation

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Abstract

In the present work, the photocatalytic degradation methyl orange (MO) by Al₂O₃-NP/SnO₂ was investigated under UV light irradiation. For this purpose, the Al₂O₃-NP electrode was synthesized under the suitable conditions by two-step anodization technique and Al₂O₃-NP/SnO₂ electrodes were prepared by sol-gel technique. The structure and morphology of the electrode were characterized by field-emission scanning electron microscope (FE-SEM), energy-dispersive X-ray spectroscopy (EDX) and X-ray diffraction (XRD). The FE-SEM results indicate that pore diameter and thickness of Al₂O₃-NP/SnO₂ are 65.92 nm and 23.75 µm, respectively. EDX analysis shows that Al₂O₃-NP/SnO₂ electrode contains 12.56 (wt.) % Sn and 44.43% O. The effect of some parameters, such as initial MO concentration, initial pH, temperature, irradiation area and reusability were determined. Kinetic analyses indicate that the photodegradation process of MO obeys the pseudo-first-order kinetic model. Additionally, thermodynamic parameters such as E_a, ΔH, ΔS and ΔG were calculated. The activation energy was determined to be 21.77 kJ/mol. This photocatalyst with good photocatalytic activity and a large surface area exhibits an effective potential in the treatment of wastewater.

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