
Silver-Doped TiO₂/Graphite Oxide Nanocatalyst: Structural Insights and Photocatalytic Performance in Dye Degradation

Sibora Bit

Emerilda Shenaj, Denis Kotorri, Sara Dervishi, Arjan Korpa

University of Tirana, Faculty of Natural Sciences, Department of Chemistry, Tirana, Albania

Arjan.korpa@fshn.edu.al

Abstract

A hybrid silver-doped TiO₂/graphite oxide (Ag–TiO₂/nGO) nanocomposite was synthesized via a sol–gel method assisted by microwave treatment and systematically characterized to establish its structural and functional properties. X-ray diffraction confirmed the predominance of anatase TiO₂ and the integration of graphite oxide within the matrix. X-ray photoelectron spectroscopy verified the incorporation of silver dopant and provided insight into elemental chemical states. Fourier-transform infrared spectroscopy identified Ti–O–Ti vibrations together with oxygen-containing functional groups from the carbon support, while FE-S/TEM imaging revealed nanoscale crystallites with uniform dispersion across the support. Photocatalytic evaluation, performed using Rhodamine B as a model pollutant, demonstrated a degradation efficiency of 90% within 60 minutes under UV–Vis irradiation. The results highlight how silver doping and the graphite oxide support synergistically enhance the physicochemical properties of TiO₂, leading to improved activity. This work provides a cost-effective pathway to design multifunctional nanocatalysts for dye degradation.

References

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- [2] Dey, A. and P.R. Gogate, Nanocomposite photocatalysts-based wastewater treatment, in *Handbook of Nanomaterials for Wastewater Treatment*, Elsevier, (2021) p. 779-809.
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Figures

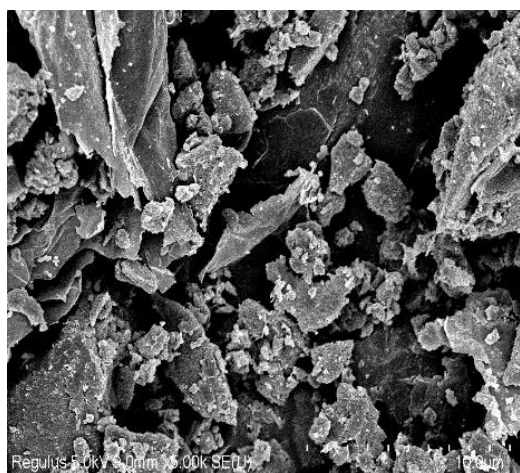


Figure 1: SEM images of Ag doped TiO₂/NG at 10 μm