# ZnO-Graphene oxide nanocomposite as a high-efficient photocatalyst for the methylene blue degradation

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The persistent contamination of water resources by synthetic dyes, such as methylene blue (MB), poses a significant threat to ecosystems and human health due to their toxicity, carcinogenicity, and resistance to natural degradation [1]. Conventional wastewater treatment methods often fail to eliminate these recalcitrant pollutants, necessitating the development of advanced photocatalytic technologies. Generally, the photocatalytic degradation requires the semiconductor nanomaterials with the band gap of ~1–4 eV for the effective degradation of contaminants for the purification of water [2]. Zinc oxide (ZnO) nanoparticles, renowned for their high photocatalytic activity, cost-effectiveness, and eco-friendliness, is considered as one of the best materials for dye degradation. However, practical efficiency of ZnO is hindered by rapid electron-hole recombination, limited visible-light utilization, and particle agglomeration. Graphene oxide (GO) is receiving increasing attention for its multifunctional character based on its large surface area, amphiphilicity, and tunable electronic properties by surface modification. Its high surface area can enhance dye adsorption, while its conductive $sp^2$-carbon network can lead to low charge transfer resistance, fast diffusion and high electron transfer rate on the ZnO hindering the electron-hole recombination.

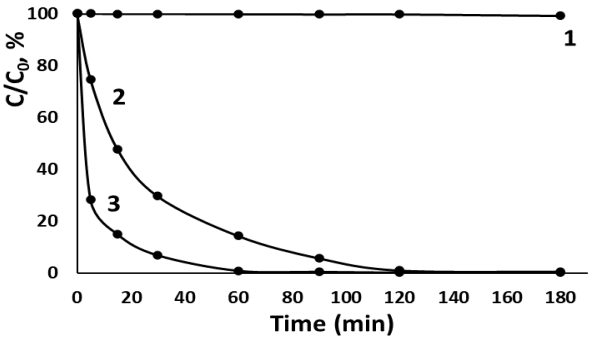


**Fig.** Photocatalytic degradation of blank MB (*1*) by ZnO nanoparticles (*2*), prepared ZnO-GO nanocomposite (*3*), where $C_0$ and $C$ represent the initial MB concentration and the concentration at a time interval

This work is devoted to the development of synthesis methods and the study of properties of ZnO-GO nanohybrid composites. Obtained materials were characterized by XRD, FTIR and tested in photodegradation of methylene blue under simulated ultraviolet light supplied by 26 W lamp at room temperature (Fig.).

1. P.O. Oladoye, T.O. Ajiboye, E.O. Omotola, O.J. Oyewola. Results Eng. **16** (2022) 100678.
2. S. Ameen, M. Shaheer Akhtar, H.-K. Seo, H. Shik Shin. Mat. Lett. **100** (2013) 261.