# Improving the Performance of WO3 for the Photodegradation of Organic Dyes in Wastewater

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Contaminated water, caused by organic dyes pollutants, is a serious problem and concern worldwide. It could cause waterborne diseases and chronic health consequences. Photocatalysts have been used for the safe removal of organic dyes from water. However, pure metal oxide catalysts such as WO3, TiO2 and ZnO have limitations due to their wide band gap and high rate of electron-hole recombination. In this study, the photocatalytic performance of WO3 was improved by the preparation of reduced Graphene Oxide (rGO) and tung-sten oxide (WO3-rGO) nanocomposite. An elegant Pulsed Laser Ablation in Liquids (PLAL) technique was applied to synthesize WO3-rGO nanocomposite. PLAL is a one-step process which does not require high temperature, toxic chem-icals, and further treatment to remove the toxic byproducts. The prepared nanocomposite was characterized using advanced analytical techniques and the results showed that the anchoring of WO3 on rGO transformed WO3-rGO into an efficient photocatalyst by enhancing its surface area, reducing the photoinduced electron-hole recombination and enhancing light absorption in the visible region which is very important for solar energy harvesting. To evaluate the photocatalytic performance of WO3- rGO, Rhodamine B (RhB) dye was used as an indicator for the degradation of organic dyes. Studies of the removal of RhB showed that the newly prepared nanocomposite is more efficient (78%) than the pure metal oxide (47%) in the visible spectral region. This study could be beneficial for the development of a wastewater treatment system for field application using solar radiation in the future.

**Awards Won:**
Fourth Award of $500