

Photocatalytic study of two-dimensional ZnO nanopellets in the decomposition of methylene blue.

ABSTRACT

We report several significant photodecomposition rates of methylene blue (MB) obtained before and after the refluxing process of own-synthesized two-dimensional (2D) zinc oxide (ZnO) nanopellets. Each photodecomposition rate of MB was found highly dependent on the weight of photocatalyst. The existing photodecomposition rate has been successfully improved to a factor of 22.0 times through refluxing process in excessive pyridine where the surface capping ligand (oleic acid) is removed from the 2D ZnO nanopellets. On the other hand, the refluxed photocatalyst (0.04 g) in this study was found to exhibit excellent recyclability up to three cycles. Furthermore, X-ray powder diffraction spectrums for the refluxed photocatalyst, respectively, before and after three cycles of photocatalytic reactions, has generated the same patterns showing that the photocatalyst is stable and feasible to be used as an efficient photocatalyst material. Hence, these 2D ZnO nanopellets would provide a new alternative route as a highly efficient photocatalyst for wastewater treatment.

Keyword: Zinc oxide; Two-dimensional nanopellets; Characterization; Photocatalyst; Methylene blue; Pseudo-first-order.