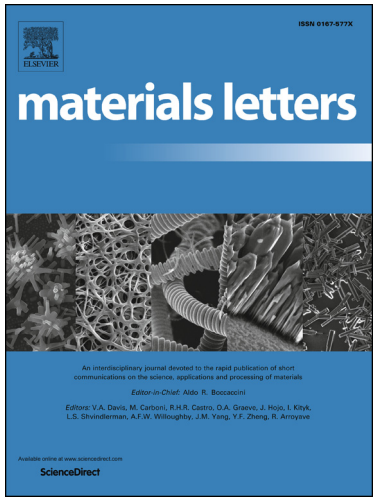

Speedy photocatalytic degradation of bromophenol dye over ZnO nanoflowers

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Speedy photocatalytic degradation of bromophenol dye over ZnO nanoflowers

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A simple, low temperature solution method was employed to synthesize ZnO nanoflowers (NFs) using zinc nitrate as precursor for the photocatalytic degradation of bromophenol (Bph) dye. The synthesized materials exhibited well-defined flower like morphology comprised of several defined nanorods. The crystalline and optical observations manifested the high crystallinity of ZnO-NFs with wide band gap of ~3.21eV. The synthesized ZnO NFs as catalysts presented a rapid degradation of Bph-dye with the degradation rate of ~96% within 120min under the UV light irradiation. The fragmentations of Bph-dye after the photocatalytic reaction over ZnO-NFs were analyzed by interpreting the mass spectroscopy of degraded Bph-dye.

Keywords: ZnO, surfaces, bromophenol dye, nanocrystalline materials, pollutant, mass spectroscopy.

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1. Introduction

Much research has been devoted to find cost-effective and efficient treatment technologies for contaminated water especially from colored dyes. The wastes of coloring and textiles factories are the major sources of water contamination or water pollution because these industries use non-biodegradable organic color molecules [1-2]. For instance, bromophenol (Bph) dye is an organic dye, non-biodegradable and widely used as color marker to monitor the process of agarose gel electrophoresis, drugs, cosmetics, textiles, printing inks, and as an acid–base indicator [3]. Bph-dye is highly water soluble and could slowly contaminate the soil and fresh water [4]. Thus, adequate treatment techniques are demanded for wastewater treatment to clean the environment and sustainable methods are required for remediating the broad diversity of dye wastes like Bph-dye. A remediation process called the photocatalytic process is adopted broadly and received a great deal of attention due to its ability to mineralize organic into less toxic chemicals or transfer to another environment in the presence of semiconducting materials as catalysts [5,6].

Recently, zinc oxide (ZnO) semiconducting materials are testified as the photocatalyst for dye