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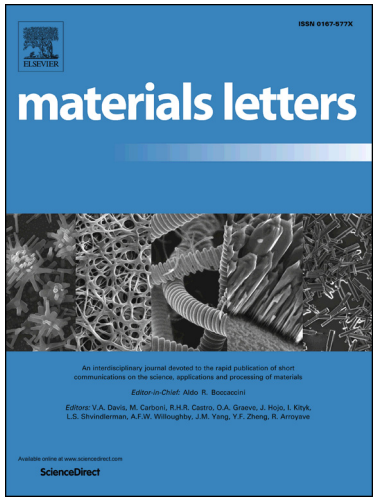

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A facile route for fabrication of hierarchical porous Nb_2O_5/ZnO composites with enhanced photocatalytic degradation of palm oil mill effluent

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ABSTRACT

A facile route was demonstrated for the synthesis of hierarchical porous ZnO microspheres based on a surfactant-free chemical solution method. The as-synthesized ZnO were assembled by large numbers of interleaving nanosheets and formed an open porous structure. Under UV irradiation, the as-synthesized ZnO exhibited photocatalytic property on the degradation of palm oil mill effluent (POME) solution. The Nb_2O_5 decorated ZnO photocatalysts (Nb_2O_5/ZnO) with enhanced photocatalytic performances were also synthesized via a facile and rapid route. Compared with ZnO, the Nb_2O_5(3 wt%)/ZnO exhibited the best POME degradation and colour removal efficiencies of 91.7% and 100%, respectively after 240 min irradiation. Phytotoxicity of the POME after Nb_2O_5/ZnO photocatalysis was significantly reduced via the measurement of radicle lengths of *Vigna radiata*. The observed results demonstrated the photocatalytic technology using hierarchical Nb_2O_5/ZnO composites had the potential to effectively purify wastewater.

Keywords: Semiconductors, Composite materials, Microstructure, Optical materials and properties

1. Introduction

Oily wastewater from palm oil food industry is a thick brownish liquid waste containing extremely high quantities of organic pollutants. Past research report indicated a discharge of 2.5-3.75 tonnes of palm oil