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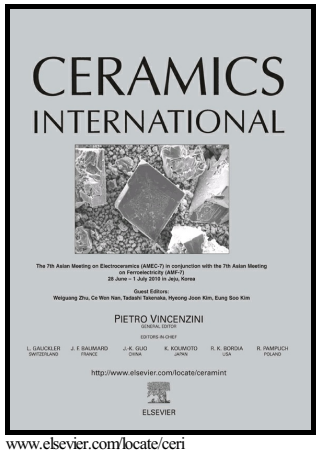

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PII: S0272-8842(16)31241-X
DOI: http://dx.doi.org/10.1016/j.ceramint.2016.07.161
Reference: CERI13386

To appear in: *Ceramics International*

Received date: 19 April 2016
Revised date: 6 July 2016
Accepted date: 23 July 2016

Cite this article as: Shiyun Lou, Wan Wang, Xianbin Jia, Yongqiang Wang and Shaomin Zhou, A unique nanoporous graphene-ZnxCd$_{1-x}$S hybri nanocomposite for enhanced photocatalytic degradation of water pollutants *Ceramics International,* http://dx.doi.org/10.1016/j.ceramint.2016.07.161

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A unique nanoporous graphene-$Zn_xCd_{1-x}S$ hybrid nanocomposite for enhanced photocatalytic degradation of water pollutants

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Abstract

In this work, a novel in-situ solvothermal reduction route has been made to immobilize of nanoporous $Zn_xCd_{1-x}S$ aggregates on graphene nanoribbons by using PVP as a stabilizer and thiourea as a sulphur source. The nanoporous $Zn_xCd_{1-x}S$ aggregates with diameters of 20–30 nm assembled from $Zn_xCd_{1-x}S$ nanocrystals (3-5 nm) are homogeneously anchored on graphene nanoribbons and the unique structure of graphene-$Zn_xCd_{1-x}S$ nanocomposites has contributed to large specific surface area (102.1 m^2/g). Despite the analogous size and configuration, the nanoporous graphene-$Zn_xCd_{1-x}S$ hybrid nanocomposites exhibited composition-dependent photocatalytic performances for the degradation of methyl orange (MO) under visible light. In particular, graphene-$Zn_{0.5}Cd_{0.5}S$ was capable of nearly completely degrading MO in 150 minutes. The excellent photocatalytic activity was proposed to arise from the synergy effect between nanoporous $Zn_xCd_{1-x}S$ aggregates and graphene, the suitable band gap, intimate interfacial contact, and unique nanoporous structure. Moreover, the work provides a simple strategy to prepare various nanoporous graphene-semiconductor nanocomposites.

Keywords: Nanoporous; Photocatalysis; Graphene; $Zn_xCd_{1-x}S$; Nanocomposite

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