Desalination and Water Treatment
www.deswater.com

doi: 10.5004/dwt.2021.27433

237 (2021) 97–107
October

In-situ N-doped TiO_2/mesoporous g-C_3N_4 nanosheets S-scheme heterojunction derived from supramolecular precursor with enhanced visible-light photocatalytic performance

Changsheng Ban[a,b], Jun Li[a,b,*], Yang Jin[a,b], Longtao Zuo[a,b], Wenqi Xu[a,b]

[a]*School of Chemical Engineering, Sichuan University, Chengdu 610065, China, emails: lijunlab@163.com (J. Li), bcsno1@163.com (C. Ban), jinyangyoung@126.com (Y. Jin), zuolongtao@qq.com (L. Zuo), xuwenqi0401@163.com (W. Xu)*
[b]*Engineering Research Center for Comprehensive Utilization and Cleaning Process of Phosphate Resource, Ministry of Education, Chengdu 610065, China*

Received 28 January 2021; Accepted 15 May 2021

ABSTRACT

The N-doped TiO_2/g-C_3N_4 S-scheme heterojunction with holy nanosheet framework has been synthesized by a simple pyrolysis process of amorphous TiO_2 and melamine-cyanaurate complex. During the formation of heterojunction photocatalysts, the interaction of two precursors not only provided in-situ nitrogen doping in TiO_2, but also construct S-scheme charge transfer channel. Also, N-TiO_2/g-C_3N_4 exhibited a porous nanosheet structure due to the co-crystallization of TiO_2 and g-C_3N_4 at 450°C. The enhancement in narrower bandgap and photogenerated charge carrier separation resulted in superior photocatalytic activities with the highest degradation rate of Methylene blue was recorded by MCN/T-50, which was 2.3 and 3.7 times that of bulk g-C_3N_4 and pristine TiO_2. The possible mechanism for the enhanced photocatalytic performance is proposed in this study. The doped S-scheme heterojunction materials prepared from the co-crystallization of precursors in calcination give a broad prospect for the future design of a highly efficient visible-light-driven photocatalyst.

Keywords: N-doped TiO_2; Mesoporous g-C_3N_4; Melamine-cyanaurate complex; S-scheme heterojunction; Degradation

* Corresponding author.