Oxygen vacancies and phosphorus codoped black titania coated Carbon nanotube composite photocatalyst with efficient photocatalytic performance for the degradation of acetaminophen under visible light irradiation

Xianyong Feng, Peifang Wang, Jun Hou, Jin Qian, Chao Wang, Yanhui Ao

PII: S1385-8947(18)31075-1
DOI: https://doi.org/10.1016/j.cej.2018.06.037
Reference: CEJ 19248

To appear in: *Chemical Engineering Journal*

Received Date: 25 December 2017
Revised Date: 10 May 2018
Accepted Date: 8 June 2018

Please cite this article as: X. Feng, P. Wang, J. Hou, J. Qian, C. Wang, Y. Ao, Oxygen vacancies and phosphorus codoped black titania coated Carbon nanotube composite photocatalyst with efficient photocatalytic performance for the degradation of acetaminophen under visible light irradiation, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.06.037

Oxygen vacancies and phosphorus codoped black titania coated Carbon nanotube composite photocatalyst with efficient photocatalytic performance for the degradation of acetaminophen under visible light irradiation

Xianyong Feng, Peifang Wang *, Jun Hou, Jin Qian, Chao Wang, Yanhui Ao*

Key Laboratory of Integrated Regulation and Resource Development on Shallow Lakes, Ministry of Education, College of Environment, Hohai University, Nanjing, 210098, China

Abstract

In the past two decades, carbon-titania composite photocatalysts had attracted extensive attention for high photocatalytic performance. However, their visible light driven activity was still limited. Therefore, it was urgent to find a way to improve its visible light responsive photocatalytic activity. In the present work, a novel efficient visible light driven photocatalysts, oxygen vacancies and phosphorus (P) codoped titania coated carbon nanotube composites (OVPTCN), were prepared by a facile two step solvothermal and phosphorization method for the first time. The obtained sample exhibited significantly enhanced photocatalytic performance for acetaminophen (ACE) degradation under visible light irradiation. The effects of carbon nanotube (CNT) amount and phosphorization content on the photocatalytic efficiency for ACE degradation were also investigated deeply. Results showed that the optimal sample exhibited a high rate constant of 0.025 min^{-1} for ACE degradation in contrast to that of pure TiO_2 (0.00053 min^{-1}) and titania-carbon nanotube (TCN) composite (0.0036 min^{-1}). The characterization results suggested that phosphorization could produce

* Corresponding author. E-mail: andyao@hhu.edu.cn (Y.H. Ao), pfwang2005@hhu.edu.cn (P.F. Wang)