

# Accepted Manuscript

Full Length Article

Visible-Light Upconversion Carbon quantum dots decorated TiO<sub>2</sub> for the Photodegradation of Flowing Gaseous Acetaldehyde

NYidan Hu, Xiaofeng Xie, Xiao Wang, Yan Wang, Yi Zeng, David Y.H. Pui, Jing Sun

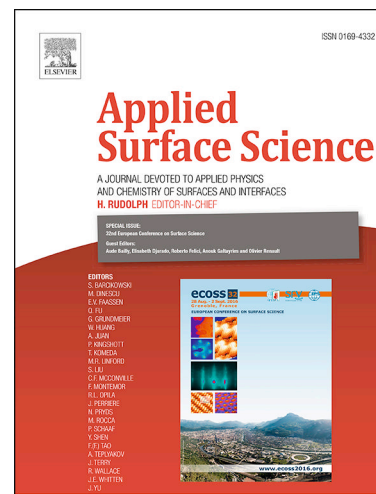
PII: S0169-4332(18)30114-4  
DOI: <https://doi.org/10.1016/j.apsusc.2018.01.104>  
Reference: APSUSC 38243

To appear in: *Applied Surface Science*

Received Date: 10 December 2017  
Revised Date: 5 January 2018  
Accepted Date: 10 January 2018

Please cite this article as: N. Hu, X. Xie, X. Wang, Y. Wang, Y. Zeng, D.Y.H. Pui, J. Sun, Visible-Light Upconversion Carbon quantum dots decorated TiO<sub>2</sub> for the Photodegradation of Flowing Gaseous Acetaldehyde, *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.01.104>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Visible-Light Upconversion Carbon quantum dots decorated TiO<sub>2</sub> for the Photodegradation of Flowing Gaseous Acetaldehyde

Yidan Hu<sup>1,2</sup>, Xiaofeng Xie<sup>\*1</sup>, Xiao Wang<sup>1</sup>, Yan Wang<sup>1</sup>, Yi Zeng<sup>1</sup>, David Y.H. Pui<sup>3</sup>, Jing Sun<sup>1</sup>

<sup>1</sup> Shanghai Institute of Ceramics, Chinese Academy of Sciences, 1295 Dingxi Road, Shanghai 200050, China.

<sup>2</sup> University of Chinese Academy of Sciences, 19 (A) Yuquan Road, Beijing 100049, China.

<sup>3</sup> College of Science and Engineering, University of Minnesota, Minneapolis, MN 55455, USA.

## Corresponding Author

\*E-mail address: [xxfshcn@163.com](mailto:xxfshcn@163.com)

**KEYWORDS:** Carbon quantum dots, Titania; Upconversion; Photocatalysis, Acetaldehyde removal

**ABSTRACT:** Carbon-modified photocatalyst has attracted extensive attentions in the field of gaseous pollutant removal, mainly due to the improved adsorption properties and electronic transport of carbon matrix, such as carbon nanotubes, graphene, and fullerene, etc. In this work, carbon quantum dots (CQDs) were employed to enhance the photocatalytic performance of TiO<sub>2</sub>-based composites for flowing gaseous acetaldehyde removal. Besides the aforementioned advantages of carbon materials, the unique up-converted photoluminescence property of CQDs is capable of extending the optical absorption to visible-light range. Moreover, the electron spin resonance (ESR) results firstly verified a stable existence of Ti<sup>3+</sup> in the CQDs/TiO<sub>2</sub> composite, which is possibly induced by the electron migration from CQDs to TiO<sub>2</sub>. And the formed Ti<sup>3+</sup> donor energy level in the band gap could further help with the visible-light harvesting. During the photodegradation experiments, with two-hour continuous flowing gaseous acetaldehyde injection (500 ppm, 20

Download English Version:

<https://daneshyari.com/en/article/7835218>

Download Persian Version:

<https://daneshyari.com/article/7835218>

[Daneshyari.com](https://daneshyari.com)