

## Accepted Manuscript

Title: Advanced cotton fibers exhibit efficient photocatalytic self-cleaning and antimicrobial activity

Authors: Jared Jaksik, Phong Tran, Veronica Galvez, Issac Martinez, Darian Ortiz, Andy Ly, Monica McEntee, Erin M Durke, Sayeeda TJ Aishee, Margaret Cua, Ahmed Touhami, H. Justin Moore, M. Jasim Uddin



PII: S1010-6030(18)30482-9  
DOI: <https://doi.org/10.1016/j.jphotochem.2018.07.037>  
Reference: JPC 11403

To appear in: *Journal of Photochemistry and Photobiology A: Chemistry*

Received date: 13-4-2018  
Revised date: 18-7-2018  
Accepted date: 23-7-2018

Please cite this article as: Jaksik J, Tran P, Galvez V, Martinez I, Ortiz D, Ly A, McEntee M, Durke EM, Aishee ST, Cua M, Touhami A, Moore HJ, Uddin MJ, Advanced cotton fibers exhibit efficient photocatalytic self-cleaning and antimicrobial activity, *Journal of Photochemistry and Photobiology, A: Chemistry* (2018), <https://doi.org/10.1016/j.jphotochem.2018.07.037>

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.

Advanced cotton fibers exhibit efficient photocatalytic self-cleaning and antimicrobial activity

Jared Jaksik<sup>a</sup>, Phong Tran<sup>a</sup>, Veronica Galvez<sup>a</sup>, Issac Martinez<sup>a</sup>, Darian Ortiz<sup>a</sup>, Andy Ly<sup>a</sup>, Monica McEntee<sup>b</sup>, Erin M Durke<sup>b</sup>, Sayeeda TJ Aishee<sup>a</sup>, Margaret Cua<sup>a</sup>, Ahmed Touhami<sup>c</sup>, H. Justin Moore<sup>a</sup>, M. Jasim Uddin<sup>a\*</sup>

<sup>a</sup>Department of Chemistry

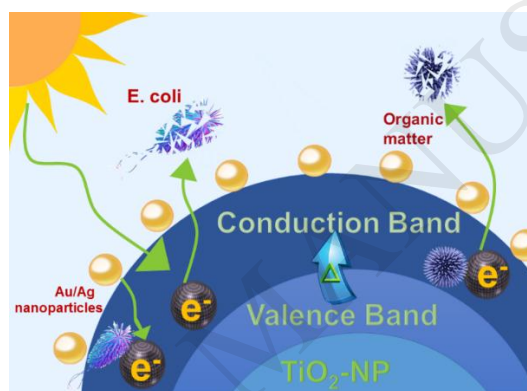
The University of Texas Rio Grande Valley  
1201 W University Dr, Edinburg, TX 78539, United States

<sup>b</sup>US Army Edgewood Chemical Biological Center, Aberdeen MD 21010

<sup>c</sup>Department of Physics, 1 West University Boulevard, Brownsville, TX 78520, United States  
Phone: 956-665-7462 Fax: 956-665-5006

\*Corresponding Author: Email jasim.uddin@utrgv.edu

## GRAPHIC ABSTRACT



**ABSTRACT** Functional cotton fibers have a wide range of applications in domestic, commercial, and military settings, and so enhancing the properties of these materials can yield substantial benefits. Herein, we report the creation of functional fibers that are self-cleaning, anti-microbial, and protective against UV radiation. A uniform, and high surface area films of TiO<sub>2</sub> were deposited on cotton fibers and gold / silver nanoparticles were directly incorporated on the nanostructured TiO<sub>2</sub> surface. The synthetic method is simple and the produced TiO<sub>2</sub> film is homogenous and the nanoparticles were shown to be effectively distributed on the surface using a simple photocatalytic reduction method. The Ag/Au-TiO<sub>2</sub> coated fibers was morphologically characterized using atomic force microscopy (AFM) and scanning electron microscopy / energy dispersive X-ray spectroscopy (SEM/EDS), and the self-cleaning properties of noble metal nanoparticle / TiO<sub>2</sub> coated fibers were demonstrated by repeated staining followed by exposure to simulated solar light. The 1 mM Ag-TiO<sub>2</sub> coated fabric was observed to have the largest improvement in rate of stain extinction compared to the untreated fibers with a methylene blue stain, and the 1 mM Au-TiO<sub>2</sub> coated fibers were observed to have the largest

Download English Version:

<https://daneshyari.com/en/article/6492340>

Download Persian Version:

<https://daneshyari.com/article/6492340>

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