

## Accepted Manuscript

Dragon fruit-inspired quantum scale-designed photocathodes

Wei Shi, Zhifa Shan, Bingan Lu

PII: S0167-577X(17)31513-6  
DOI: <https://doi.org/10.1016/j.matlet.2017.10.038>  
Reference: MLBLUE 23273

To appear in: *Materials Letters*

Received Date: 19 June 2017  
Revised Date: 8 October 2017  
Accepted Date: 11 October 2017

Please cite this article as: W. Shi, Z. Shan, B. Lu, Dragon fruit-inspired quantum scale-designed photocathodes, *Materials Letters* (2017), doi: <https://doi.org/10.1016/j.matlet.2017.10.038>

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.



## Dragon fruit-inspired quantum scale-designed photocathodes

Wei Shi,<sup>1a</sup> Zhifa Shan,<sup>1b</sup> Bingan Lu<sup>1a\*</sup>

<sup>a</sup>School of Physics and Electronics, State Key Laboratory of Advanced Design and Manufacturing for Vehicle Body, Hunan University, Changsha 410082, People's Republic of China

Email: luba2012@hnu.edu.cn

<sup>b</sup>Department of Physics, Laboratory of Nanoscale Condense Matter, Physics and State Key Laboratory of Physical Chemistry of Solid Surfaces, Xiamen University, Xiamen 361005, China

### Abstract

The development of environment-friendly, high-performance, and low-cost photoelectrocatalysts is hindered by the low separation efficiency of electron-hole pairs, corrosion from light illumination, and harsh environments. In this study, we propose a hierarchical structured nanocomposite that addresses all the aforementioned problems. Our design is inspired by the structure of a dragon fruit, in which CuInS<sub>2</sub>/CdS quantum dots (QDs) are encapsulated with TiO<sub>2</sub> nanofilms. CuInS<sub>2</sub>/CdS QDs possess effective charge separation capability but suffer from photocorrosion, whereas TiO<sub>2</sub> exhibits the opposite behavior. As a result of this hierarchical arrangement, the complementary system exhibits outstanding durability (lasting longer than 240 h without decay) and high-performance photoelectrocatalysis activity (potentials of approximately -0.219 V to obtain current densities of 100 mA cm<sup>-2</sup>) under light illumination.

**Keywords:** Dragon fruit-inspired; quantum scale; CuInS<sub>2</sub>/CdS quantum dots; TiO<sub>2</sub> nanofilms; photoelectrocatalysis

### 1. Introduction

The development of renewable and clean resources has inspired a huge amount of research on utilizing

Download English Version:

<https://daneshyari.com/en/article/8015195>

Download Persian Version:

<https://daneshyari.com/article/8015195>

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