



主持人

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協調單位

Jozef Stefan Institute

參與單位

- 1 Slovenia/ Jozef Stefan Institute
- 2 Latvia/Institute of Solid State Physics, University of Latvia
- 3 Taiwan/Department of Chemical Engineering, National Taiwan University

Prof. Jeffrey C. S. Wu received his PhD degree in Chemical Engineering from University of Pittsburgh. His research interest is photocatalysis include (a) photoreduction of CO<sub>2</sub> to fuel, (b) photocatalytic water splitting for H<sub>2</sub> and (c) photocatalytic oxidation of air pollutants. (d) Biomass conversion of biodiesel and bioethanol. He has received a number of awards including, Outstanding Engineering Professors Award, Chinese Institute of Engineers Taiwan in 2016; Outstanding Cross-Sector Collaboration Award, 2nd National Industrial Innovation in 2012; "Lai Tzai-Der award" of Taiwan Institute of Chemical Engineers in 2009, "Chemical Technology Award" of Taiwan Institute of Chemical Engineers in 2006, and "Silver medal of National Invention", Taiwan in 2004. He also serves as an Editor of the Catalysis Communications, a member of editorial boards of Applied Catalysis A: General. His H-index is 41 with total citation 5287.

計畫名稱

M-ERA.NET 2-JTC2018 : Functional materials

計畫編號 MOST 108-2923-E-002 -006 -MY3 執行期限 2019/07/01 - 2022/06/30

計畫縮寫

SunToChem

領域

Functional materials

方案名稱

M-ERA.NET

方案

M-ERA.NET 2 Call 2018

計畫摘要

The project of M-ERA.NET 2 JTC2018 is a research collaboration over 3 countries, included Taiwan (Chemical Engineering, National Taiwan University, ChE-NTU), Slovenia (Jozef Stefan Institute, JSI) and Latvia (Institute of Solid State Physics, University of Latvia ' ISSP LU). In this project SunToChem, the latest knowledge in density functional theory (DFT), particle crystallization mechanisms, and photo reactor design are combined to promote the understanding of key parameters in photocatalytic water splitting and provide guidelines for preparation of MTiO<sub>3</sub> (M=Sr, Ba, Ti) perovskite photocatalyst particles by design. This concept includes enhancement of photocatalytic activity of defined-shape perovskite particles through improvement of the spatial separation of photogenerated charges on the same particle by means of ferroelectricity/flexoelectricity or different polarity of the facets due to different orientation/termination, and improvement of solar light absorption by doping. The main objectives of the project include band gap and crystal facet engineering by DFT to guide the development of the perovskite particles with defined size, shape, exposed facets, and terminations and evaluation of the particles for the H<sub>2</sub> generation from photocatalytic water splitting reaction. The result will be fed back to the modification of DFT calculation in order to continuously improve the defined perovskite. The goal is to achieve Solar-to-Hydrogen over 1%, ambitiously up to 2%. JSI leads the whole project to develop novel perovskites. ISSP LU works on DFT calculation. ChE-NTU focuses on photocatalytic water splitting to generate hydrogen. The work plan of ChE-NTU in 3 years are; (1) characterize novel defined perovskite and design photoreactor; (2) perform photocatalytic water splitting experiments and seek the optimal photo reaction conditions; (3) evaluate the best perovskite photocatalyst and find the key parameters and guidelines.

