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- 國立清華大學 碩士，民國八十八年
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主要研究領域

■ 鈣鈦礦太陽能電池的研究與開發

針對鈣鈦礦太陽能電池（PSCs）的研究，主要集中在提升效率、穩定性和可持續性。關鍵領域包括透明電池、表面鈍化、無毒溶劑、MA修復以及無機孔輸送材料（HTMs）以提高穩定性。優化鈣鈦礦太陽能電池在微弱光照下的應用，並探索串聯太陽能電池，旨在突破單界面電池的效率極限。

■ 表面處理與電化學鍍金

電化學鍍金的研究專注於控制矽烷處理以改善表面附著力、開發新型的鈀催化劑進行無電鍍，以及對各種基材應用表面修改技術。這使得通過先進的無電鍍方法，能夠在任何基材上進行高效的鍍金，包括矽太陽能電池和柔性印刷電路板（PCB）。

■ 染料敏化太陽能電池的技術發展

高效元件設計與製作，奈米鉑對電極優化，陽極摻雜及界面修飾，紫質染料共吸附優化，大面積模組製程設計與製作，低光亮度元件設計及其室內應用。

代表作 (Selected Publications)

- Ching-Chin Chen, Yu-Hsuan Chen, Vinh Son Nguyen, Sheng-Yang Chen, Meng-Chen Tsai, Jia-Sian Chen, Sing-Yu Lin, **Tzu-Chien Wei**, Chen-Yu Yeh, "Double Fence Porphyrins Featuring Indacenodithiophene Group as an Effective Donor for High-Efficiency Dye-Sensitized Solar Cells" *Advanced Energy Materials*, 2023. (IF = 24.4, Rank = 4/79).
- Faragally, Faragally A.; Musa, Ahmed Fouad; Chen, Ching-Chin; Chen, Yu-Hsuan; Chen, Yan-Da; Yeh, Chen-Yu; **Tzu-Chien Wei**, "Double Anthracene-Based Sensitizers for High-Efficiency Dye-Sensitized Solar Cells under Both Sunlight and Indoor Light" *SMALL STRUCTURES*, 2024. (IF = 13.9, Rank = 13/140).
- Duc-Anh Le; Kala, Kannankutty; Tzu-Sen Su; Perumbalathodi Nideesh ; **Tzu-Chien Wei**, "Control of methylamine Gas Treatment for Upscaling Perovskite Solar Module" *SOLAR RRL*, 2024. (IF = 6, Rank = 106/438).
- Nideesh Perumbalathodi, Tzu-Sen Su, Zi-Fan He, Kala Kannankutty, **Tzu-Chien Wei**, "Bidirectional Passivation for Highly Efficient and Stable CuSCN-Based Perovskite Solar Cells Using (3-Mercaptopropyl) trimethoxysilane" *ACS Applied Energy Materials*, 2024. (IF = 5.4, Rank = 118/438).
- Kattoor Vidya ; Pei-Tsen Wei; Zi-Fan He; **Tzu-Chien Wei**, "Manipulating the adhesion of electroless plated Cu film on liquid polymer crystal substrate for advanced microelectronic manufacturing" *ISCIENCE*, 2024. (IF=4.6, Rank =19/134).
- Pei-Qing Yang, Yi-Ting Wu, **Tzu-Chien Wei**, "Combining Molecular Interaction and Physical Anchoring Effect to Achieve Ultra-High Adhesion Electroless Copper Plating on Glass Substrates" *Journal of The Electrochemical Society*, 2025. (IF =3.1, Rank=9/23).

Main Research Interests

■ Research and development of perovskite solar cell

Research on perovskite solar cells (PSCs) focuses on improving efficiency, stability, and sustainability. Key areas include transparent cells, surface passivation, non-toxic solvents, MA healing, and inorganic hole transport materials (HTMs) for better stability. Optimizing PSCs for dim light applications and exploring tandem solar cells aim to push efficiency beyond single-junction limits.

■ Surface treatment and Electrochemical Metallization

Research in electrochemical metallization focuses on controlling silane treatment for better surface adhesion, developing a novel Pd catalyst for electroless plating, and applying surface modification techniques for various substrates. This enables efficient metallization on any substrate, including silicon solar cells and flexible PCBs, through advanced electroless plating methods.

■ Technology Developments on Dye Sensitized Solar Cell

Highly efficient DSSC device design and fabrication, including nano-platinum counter electrode optimization, doping and interface modification on photoanode, co-sensitization of porphyrin and organic dye, module device design & fabrication and device design for low-sun and indoor application .



教授簡介

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