



Zhenchuan Tian

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EDUCATION

Universitat Autònoma de Barcelona (UAB), Barcelona, Spain

09/2024-Present

Expected Degree: PhD in Materials Science

Supervisor: Prof. Monica Lira-Cantú (Catalan Institute of Nanoscience and Nanotechnology)

Universitat Pompeu Fabra (UPF), Barcelona, Spain

09/2023-07/2024

Degree: Master of Multidisciplinary Research in Experimental Sciences (BIST Joint Master Program)

Supervisor: Prof. Monica Lira-Cantú (Catalan Institute of Nanoscience and Nanotechnology)

Sichuan University of Science and Engineering, Sichuan, China

09/2019-06/2023

Degree: Bachelor of Engineering in Materials Science and Engineering

Supervisor: Dr. Wei Liu (Sichuan Fire Science and Technology Research Institute of the Ministry of Emergency Management of China)

PUBLICATIONS

- [1] A. Chakraborty, ..., Z. Tian, ..., M. Lira-Cantú, ..., T. Brown. "Best Practices for Measuring Indoor Photovoltaic Devices: Performance and Stability testing" Submitted to ***Nature Energy***, 2026.
- [2] Z. Cai, T. Liu, **Z. Tian**, M. Lira-Cantú, Q. Guo, Z. Wang. "All-Perovskite Tandem Solar Cells with Certified Efficiency Exceeding 30%." ***Green Carbon***, 2026.
- [3] M. Karimipour, N. M. Oliveras, **Z. Tian**, F. Salutari, M. C. Spadaro, T. Zhang, N. Vahedigharehchopogh, J. Arbiol, F. Gao, M. Lira-Cantú. "Me-4PACz Functionalized MXene for Halide Perovskite Solar Cells." ***Advanced Science***, 12(39), e09898, 2025.
- [4] F. Baumann, J. Padilla-Pantoja, J. M. Caicedo-Roque, M. Karimipour, N. Vahedigharehchopogh, J. Santiso, B. Ballesteros, R. A. M. Gamboa, **Z. Tian**, S. R. Raga. "Stabilizing Perovskite Solar Cells at 85 °C via Additive Engineering and MXene Interlayers." ***EES Solar***, 1(6), 1061–1073, 2025.
- [5] K. T. Tanko, **Z. Tian**, S. Raga, H. Xie, E. A. Katz, M. Lira-Cantú. "Stability and Reliability of Perovskite Photovoltaics: Are We There Yet?" ***MRS Bulletin***, 50(4), 512–525, 2025.
- [6] W. Liu, **Z. Tian**, Z. Shen, H. Ye. "A Novel Approach to Fabricating the Durable Flame Retardant and Super Hydrophobic Dual-Functional Polyamide 66 Fabric with the Presence of Unique Solvent Effect." ***Polymer Degradation and Stability***, 112032, 2026.
- [7] W. Liu, **Z. Tian**, Z. Shen, R. Mei. "Research Process in Metal-Organic Frameworks Used in Functional Modification of Fiber/Fabrics." ***Journal of Textile Research*** (纺织学报), 45(12), 215–224, 2024.

CONFERENCES

- [1] Z. Tian, M. Lira-Cantú. 1st Online APL Energy Webinar "Emerging Trends in Applied Energy" (EmAPPE), Online, May 4, 2026. [Invited Oral Presentation]
- [2] Z. Tian, M. Lira-Cantú. 2nd International Symposium of China-Spain Young Scientists: Advanced Materials and Sustainability, Madrid, Spain, December 16, 2025. [Oral Presentation]
- [3] Z. Tian, M. Lira-Cantú. JPhD 2025, Barcelona, Spain, November 12–14, 2025. [Oral Presentation]
- [4] Z. Tian, M. Lira-Cantú. 2nd Meeting of the Excellence Network on Next-Generation Organic-Inorganic Photovoltaics (neXtPVnet), Toledo, Spain, November 6–7, 2025. [Oral Presentation]
- [5] Z. Tian, M. Lira-Cantú. II Meeting of the Research Network on Halide Perovskites and their Technological Applications, Castelló de la Plana, Spain, December 12, 2024. [Oral Presentation]

- [6] Z. Tian. BECOME PV Workshop on the Future of Emerging Photovoltaics, Brussels, Belgium, December 2–3, 2025. [Participant]
- [7] Z. Tian. Workshop on In Situ/Operando Characterization of Chemical and Electrochemical Energy Processes, Barcelona, Spain, November 8, 2024. [Participant]

HONORS, AWARDS & COMPETITIVE FUNDING

- [1] M. Karimipour, N. Monros Oliveras, **Z. Tian**, M. Lira-Cantú. tandemPV Stability Contest (Single Junction Category), tandemPV International Workshop 2025, Hasselt, Belgium & Online, May 13–15, 2025. [Award / Stability Contest Winner]
- [2] Spanish National Predoctoral Research Contract (PREP2022-000291), funded by the Agencia Estatal de Investigación (AEI), associated with project PID2022-143344OB-100, Spain, 2024–2028.
- [3] Competitive Beamtime Proposal Accepted at SOLEIL Synchrotron Radiation Facility, France, 2026.
- [4] Competitive Beamtime Proposal Accepted at Beijing Synchrotron Radiation Facility (BSRF), China, 2026.

INTERNSHIPS

Research on High-Efficiency and High-Stability Perovskite Solar Cells and Tandem Devices, Visiting PhD student at Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Supervisor: Prof. Zaiwei Wang
02/2025–05/2025

- Conducted research on high-efficiency and high-stability perovskite solar cells with three different band gaps (1.25 eV, 1.55 eV, and 1.77 eV), achieving power conversion efficiencies (PCEs) exceeding 23%, 26%, and 20%, respectively, approaching state-of-the-art performance;
- Participated in the fabrication and optimization of all-perovskite tandem solar cells, including the construction of tunneling recombination junctions (TRJs) using Atomic Layer Deposition (ALD), contributing to tandem device efficiencies above 28%;
- Utilized magnetron sputtering to deposit Transparent Conductive Oxide (TCO) thin films (ITO/IZO), which were integrated as top electrodes in four-terminal semi-transparent devices and as TRJ functional layers in two-terminal tandem architectures;

RESEARCH EXPERIENCE

Research on MXene ($\text{Ti}_3\text{C}_2\text{T}_x$) heterojunctions for highly stable Perovskite Solar Cells, Master's Student in the Catalan Institute of Nanoscience and Nanotechnology (ICN2), the Barcelona Institute of Science and Technology
09/2023–Present

- Responsible for the synthesis of Ti_3C_2 two-dimensional nanomaterials and their surface modification, and conducting comprehensive characterization of the materials using conventional materials science characterization methods (XRD, XPS, FTIR, Raman, etc.);
- Explore the synthesis of new perovskite films and use XRD, SEM, and FTIR techniques to confirm the successful synthesis of the products;
- Prepare perovskite solar cell devices, and incorporate two-dimensional nanomaterials into these cells to enhance the photoelectric conversion efficiency and stability of the cells.

Study on Theoretic Computational Calculation for Ti_3C_2 two-dimensional nanomaterials, Visiting Master's Student in the Institute of Theoretical and Computational Chemistry of the Universitat de Barcelona
01/2024-07/2024

- Learn and master the basic principles of computational chemistry (fundamentals of quantum mechanics and solid-state physics) and learn to use VASP computational chemistry software on the Linux system;
- Responsible for establishing and optimizing the unit cell structure of Ti_3C_2 , and obtaining the 4*4 supercell structure, calculating the material's band structure and density of states;
- Attempt to introduce perovskite passivating molecules (H_3pp) into the 2D material system, and calculate the adsorption energy, band structure, density of states, and differential charge density of the material, ultimately evaluating the feasibility of the reaction.

Study on the Flame-retardant Finishing of Fabric, Research Assistant in Material Fire Resistance Laboratory, Sichuan Fire Research Institute of Ministry of Emergency Management (NSFC Youth Science Foundation Project)
10/2020-07/2023

Fabrication of the Flame-retardant Nylon-66 Fabric Modified with an Inorganic–Organic Hybrid Structure

- Carried out assorted experimental frameworks and grafted acrylic acid and derivatives on the fabric by ultraviolet

radiation to acquire a functional surface;

- Chelated with various metal salts aqueous solution by pad-dry-cure technique to prompt the chelating effect between inorganic metal-ion and organic groups or molecular chain on the fabric surface, and obtained the flame-retardant Nylon fabric;
- Assisted my supervisor in further testing and characterizing the fabric flame-retardant properties and analyzing experimental data on the durability, limited oxygen index, vertical burning test, thermogravimetric analysis, and fourier transform infrared spectroscopy of the fabric.

RESEARCH SKILLS

- Expertise in the fabrication and optimization of high-efficiency perovskite solar cells (PSCs), including narrow-bandgap, wide-bandgap, and all-perovskite tandem architectures; achieved single-junction efficiencies exceeding 26% and tandem efficiencies above 28%;
- Proficient in perovskite thin-film deposition and device fabrication techniques, including spin coating, anti-solvent engineering, thermal evaporation, Atomic Layer Deposition (ALD), magnetron sputtering, and tunneling recombination junction (TRJ) integration;
- Experienced in interface engineering and charge transport layer optimization using low-dimensional nanomaterials for defect passivation, charge extraction enhancement, and device stability improvement;
- Skilled in photovoltaic and materials characterization techniques, including J–V, EQE, MPPT, XRD, SEM, AFM, UV–vis, FTIR, Raman, XPS, contact angle, and electrochemical measurements;
- Experienced in data analysis and scientific visualization using Origin and Cinema4D for photovoltaic characterization, publication-quality figures, and graphical abstract preparation;
- Strong background in polymer science and engineering, with expertise in conventional polymer modification methods, related characterization techniques, and structure–property relationship analysis of functional polymer materials.

LABORATORY DEVELOPMENT, INFRASTRUCTURE & LEADERSHIP

- Contributed to the setup and optimization of key photovoltaic research infrastructure, including Atomic Layer Deposition (ALD) systems and in-situ photoluminescence (PL) characterization platforms for operando device studies;
- Designed and optimized custom experimental accessories, including shadow masks, sample holders, and device-specific fixtures for perovskite solar cells and tandem architectures;
- Participated in the procurement, installation, calibration, and maintenance of laboratory equipment for perovskite device fabrication and characterization workflows;
- Contributed to the development and standardization of experimental protocols and safety procedures for perovskite solar cell fabrication and testing;
- Supervised, trained, and mentored students in device fabrication and characterization, and laboratory safety practices;
- Assisted in coordinating collaborative research activities within an international, multidisciplinary research environment.