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# 李超

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The Hong Kong University of Science and Technology, HK

## EDUCATION

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University of Liverpool (UOL), UK

09/2020 – 10/2024

**PhD** in chemistry

Thesis theme: Time-resolved spectroscopic studies of photocatalysts for solar fuel generation.

Supervisor: Prof. Alexander Cowan & Prof. Andrew Cooper

East China University of Science and Technology (ECUST), China

09/2017 – 06/2020

**Master's Degree** in Chemical Engineering

Wuhan University of Technology (WUT), China

09/2013 – 06/2017

**Bachelor's Degree** in Chemical Engineering and Technology

## PROFESSIONAL EXPERIENCE

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Dept. of Chemistry, The Hong Kong University of Science and Technology (HKUST), Hong Kong

**Postdoctoral Scholar**

10/2024 – present

## PUBLICATIONS

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- C. Li, T. Liu, O. Thwaites, A. M. Gardener, I. V. Sazanovich, H. Yang, X Li, A. I. Cooper and A. J. Cowan. Time-resolved vibrational spectroscopic study of molecular nanoaggregate photocatalysts. *Chemical Science*, 2024; 15, 16133-16141. <https://doi.org/10.1039/D4SC03825H>
- X. Li, C. Li, Y. Xu, Q. Liu, M. Bahri, L. Zhang, N. D. Browning, A. J. Cowan and J. Tang. Efficient hole abstraction for highly selective oxidative coupling of methane by Au-sputtered TiO<sub>2</sub> photocatalysts. *Nature Energy*, 2023; 8, 1013–1022. <https://doi.org/10.1038/s41560-023-01317-5>
- H. Yang, <sup>#</sup> C. Li, <sup>#</sup> T. Liu, T. Fellowes, S. Y. Chong, L. Catalano, M. Bahri, W. Zhang, Y. Xu, L. Liu, W. Zhao, A. M. Gardner, R. Clowes, N. D. Browning, X. Li, A. J. Cowan and A. I. Cooper. Packing-induced selectivity switching in molecular nanoparticle photocatalysts for hydrogen and hydrogen peroxide production. *Nature Nanotechnology*, 2023; 18:307-315. <https://doi.org/10.1038/s41565-022-01289-9> <sup>#</sup> joint first author
- K. H. Saeed, D. G. Osorio, C. Li, L. Banerji, A. M. Gardner and A.J. Cowan. Monitoring interfacial electric fields at a hematite electrode during water oxidation. *Chemical Science*, 2023, 14,3182. <https://doi.org/10.1039/D2SC05628C>
- C. Li, A. J. Cowan and A. M. Gardner. Transient absorption spectroscopic studies of linear polymeric photocatalysts for solar fuel generation. *Chemical Physics Reviews*, 2022; 3: 031304. <https://doi.org/10.1063/5.0098274>

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- Y. Bai, C. Li, L. Liu, Y. Yamaguchi, M. Bahri, H. Yang, A. Gardner, M. A. Zwijnenburg, N. D. Browning, A. J. Cowan, A. Kudo, A. I. Cooper and R. S. Sprick. Photocatalytic overall water splitting under visible light enabled by a particulate conjugated polymer loaded with palladium and iridium. *Angewandte Chemie International Edition*, 2022; 61: e202201299. <https://doi.org/10.1002/anie.202201299>
  - V. L. Piercy, K. H. Saeed, A. W. Prentice, G. Neri, C. Li, A. M. Gardner, Y. Bai, R. S. Sprick, I. V. Sazanovich, A. I. Cooper, M. J. Rosseinsky, M. A. Zwijnenburg, and A. J. Cowan. Time-resolved Raman spectroscopy of polaron formation in a polymer photocatalyst. *The Journal of Physical Chemistry Letter*. 2021, 12, 10899–10905. <https://doi.org/10.1021/acs.jpcllett.1c03073>
  - C. Li, C. Tong, X. Meng, Z. Xin. Property of modified polypropylene by combination of zeolites and organic phosphate salt. *China Plastics*. 2020, 34(5): 1-8.
  - C. Li, C. Tong, X. Meng, Z. Xin, Y. Shi. Effect of nucleating agent supported on zeolite via the impregnation on the crystallization ability of isotactic polypropylene and its mechanism. *Polymers for Advanced Technologies*, 2019; 30:2674-2685. <https://doi.org/10.1002/pat.4697>

## SKILLS & EXPERTISE

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Ultrafast (fs -ns) laser spectroscopy (transient UV/Vis, time-resolved resonance Raman and time-resolved infrared); slow ( $\mu$ s-s) transient UV/Vis spectroscopy; photoinduced absorption spectroscopy; spectroelectrochemistry; emission spectroscopy/TCSPEC; polymer and inorganic materials photocatalysis; kinetic analyses and complex data fitting (global/target lifetime approaches and lifetime density approaches); experienced in wide-range of data acquisition/control/analysis software platforms (Origin, Labview, Optimus, Carpetview, ChemDraw, etc.)

## ACADEMIC EXPERIENCE

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Department of Chemistry, The Hong Kong University of Science and Technology, HK

**Project: Ultrafast spectroscopic study of MOF materials for photocatalytic reaction.**

10/2024– present

Supervisors: Prof. Tengting Chen

Collaborator: Prof. Yangjian Quan's group (HKUST)

- Studying the charge carrier dynamics and photo-reductive C-F cleavage mechanism on MOF materials by using various timescales transient absorption and vibrational spectroscopies which are being submitted in a top journal.

Stephenson Institute for Renewable Energy and Department of Chemistry, University of Liverpool, UK

**Project: Transient absorption spectroscopic study of high entropy alloy co-catalysts on metal oxides.**

02/2023– 09/2024

Supervisors: Prof. Alexander Cowan

Collaborator: Prof. Tung Han Yang's group (NTHU)

- Studying the charge transfer dynamics and photocatalysis mechanism of high entropy alloy co-catalyst on metal oxide semiconductor for H<sub>2</sub> production by using fs-ns and  $\mu$ s-s transient (UV-vis)

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absorption spectroscopies (TA).

**Project: Transient absorption spectroscopic study on Au-sputtered TiO<sub>2</sub> photocatalyst for methane conversion.** 02/2022– 08/2023

Supervisor: Prof. Alexander Cowan

Collaborator: Prof. Junwang Tang's group (UCL)

- Identified the nature of excited state in TiO<sub>2</sub>, explored that the Au acts as an efficient hole acceptor and to assess its potential role in O<sub>2</sub> reduction, and investigated the photocatalytic mechanism of Au-loaded TiO<sub>2</sub> by using fs-ns and  $\mu$ s-s TA spectroscopies in a study that was published in Nature Energy.

**Project: Interplay of D/A geometric variation and aggregation ( $\pi$ - $\pi$  interaction) in controlling the nature of CT state formation.** 10/2020– present

Supervisor: Prof. Alexander Cowan & Andrew Cooper

Collaborator: Prof. Andrew Cooper's group (UOL) and UK Central Laser Facility (CLF)

- Utilised variable-temperature emission, fs-ns and  $\mu$ s-s transient (UV-vis) absorption spectroscopies (TA) and time-resolved infrared (TRIR) spectroscopies, and (UV-vis-IR) spectroelectrochemistry measurement to investigate a donor-acceptor molecule photophysics and the role of aggregation and solvent in controlling photocatalytic activity with the study published in Nature Nanotechnology (joint first author).
- Used a range of transient vibrational spectroscopies to rationalise the novel switching behaviour between hydrogen evolution and H<sub>2</sub>O<sub>2</sub> production which are being submitted as two separate first author papers.

**Project: Transient absorption spectroscopic study of IrO<sub>x</sub>-loaded linear polymeric photocatalyst (P10) for visible-light driven water splitting.** 10/2020– 02/2022

Supervisors: Prof. Alexander Cowan & Prof. Andrew Cooper's (UOL)

- Utilised TA spectroscopy and global fitting analysis method of TA data to study the photocatalytic mechanisms of a polymer photocatalysts that achieves complete water splitting. The work was reported in Angewandte Chemie.
- Using my expertise in polymer photocatalysts I was the first author of a review published in Chemical Physics Reviews.

Shanghai Key Laboratory of Multiphase Materials Chemical Engineering and Department of Production Engineering, ECUST

**Project: Application of Zeolites in Low VOC Materials, ECUST** 10/2019 – 06/2020

Research Assistant

Supervisors: Prof. Zhong Xin & Prof. Xin Meng

- Proposed zeolite (Z) as a promising loading and nucleation inducing additive along with adsorbent in polypropylene (PP) matrix; demonstrated improvements in the crystallinity (using DSC, XRD, and polarisation microscope) and mechanical properties (tensile strength, flexural modulus, and

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impact strength after the injection moulding) of the Z-PP composites; explored the effects of the concentration (0.2–15 wt%) and crystalline form of the zeolite on the crystallization temperature, crystal form and size, and demonstrated that Z13X/isotactic polypropylene (iPP) exhibited the best performance and independently verified the immobilisation role of the zeolite in increasing oxidation induction time.

**Project: Derivation of Nucleation Efficiency of Polypropylene Nucleating Agent Based on Molecular Dynamics Simulation and Its Development** 01/2018 – 06/2020

National Natural Science Foundation of China (Project No.: 21776079)

*Research Assistant*

Supervisors: Prof. Zhong Xin

- Innovatively applied hydroxyl-rich zeolite, which is a well-known catalyst carrier, to disperse NA11, a highly efficient nucleating agent in polypropylene, by forming C-H network; characterised the zeolite loaded nucleating agent 4A/NA11 using BET, XRD, and TEM, whereby the mechanism of the interactions in this composite was figured out; observed the dispersion of 4A/NA11 in the PP matrix through statistically analysing the size and number of the NA11 etched holes on ultra-thin slices of the injection-moulded splines, which were formed due to its dissociation in ethanol, by processing the SEM images with ImageJ; looked into the crystallinity and mechanical properties of the modified PP; utilised isothermal and non-isothermal crystallisation kinetics to simulate the practical manufacturing process and quantified the crystallinity of iPP;
- Wrote up the manuscript for publication, which has been published in *Polymers for Advanced Technologies* and made an oral Presentation titled ‘Effect of melt insensitive nucleator supported on zeolite on the crystallization ability of isotactic polypropylene’ at the International Conference on Plastic Engineering & Polymer Science in Tokyo.

## CONFERENCE & AWARDS

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<i>Oral presentation</i> at solar chemicals network’s first symposium	January 2024
<i>Oral presentation</i> at Chemistry PGR symposium	July 2023
<i>Poster oral presentation</i> at STFC CLF Artemis, Octopus, and ULTRA User Meeting	March 2023
<i>Poster presentation</i> and awarded a poster presentation award from Journal of materials chemistry A at 10 <sup>th</sup> Solar Fuel Network Symposium and ECR event	July 2022
<i>Poster presentation</i> at Chicheley Hall research seminar	March 2022
<i>Oral Presentation</i> at the International Conference on Plastic Engineering & Polymer Science, Japan	June 2019