

WEIRAN ZHENG

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Department of Applied Biology and Chemical Technology ◇ The Hong Kong Polytechnic University

EDUCATION

Wuhan University

Ph.D. in Physical Chemistry

Synthesis and Electrocatalytic Properties of Polymer-stabilized Noble Metal Nanoparticles

Supervisor: Prof. S. C. E. Tsang (Oxford) and Prof. X.L. Hong (Wuhan)

Wuhan, China

Sept., 2009 - Dec., 2015

University of Oxford

Joint Ph.D. in Physical Chemistry

Supported by Chinese Scholarship Council

Oxford, United Kingdom

Oct., 2012 - Sept., 2014

Wuhan University

B.S. in Chemistry

Wuhan, China

Sept., 2005 - June, 2009

RESEARCH EXPERIENCE

Hong Kong Polytechnic University

Postdoctoral Research Fellow

Hong Kong, China

May, 2016 - Present

Electrocatalysis

- Establish *in-situ* technique (UV-Vis, Raman, and AFM) to study the morphological and structural evolutions of electrocatalyst during electrochemical process;
- Water splitting (oxygen evolution reaction and hydrogen evolution reaction) study using 2D materials as the electrocatalyst;
- Glucose electrooxidation using metal ion (Cu, Co, and Ni) as electrocatalyst;

Battery Study

- (2015-2016) Study of the electrode structure evolution (anode and cathode) after cycling test of commercial 18650 Lithium ion battery (project in collaboration with GP batteries international™);
- 2D materials as battery anode;

Hong Kong Polytechnic University

Research Assistant

Hong Kong, China

Dec., 2014 - May, 2016

- Carbon dioxide electroreduction using conductive polymer (polyaniline) stabilized metal nanoparticle composite;
- Development of glucose electrooxidation catalysts based on conductive polymer/graphene/metal nanoparticle composite;

University of Oxford

Ph.D. Visiting Student

Oxford, United Kingdom

Oct., 2012 - Oct., 2014

- Development of conductive polymer (polythiophene, polyaniline)-metal nanoparticle composite for electrochemical and photochemical catalytic reaction: carbon monoxide electrooxidation, formic acid electrooxidation *et al.*;
- Shape-controlled synthesis of Pd, Pt nanocrystals for formic acid decomposition and using *in-situ* FTIR technique for surface adsorbed species mapping;

PEER-REVIEWED PUBLICATIONS

Details can be found via my ORCID (0000-0002-9915-6982) and Google scholar profile, with a h-index of 14 (April 28, 2021).

Co-first authorship

1. W. Zheng, L.Y.S. Lee, K. Y. Wong, Improving the Performance Stability of Direct Seawater Electrolysis: From Catalyst Design to Electrode Engineering, **2021**, *submitted to Nanoscale*
2. W. Zheng, Y. Li, L.Y.S. Lee, Electrochemical Glucose Sensing with Low-Toxic Bismuth and Transition Metal-Doped Bismuth Nanoparticles, **2021**, *preparing*

3. J. Yan, X. Zhang, W. Zheng, L.Y.S. Lee, Interface Engineering of 2D-C₃N₄/NiFe-LDH Heterostructure for Highly Efficient Photocatalytic Hydrogen Evolution, **2021**, *submitted to ACS Applied Materials & Interfaces*
4. W. Zheng, Y. Li, C.-S. Tsang, P.-K. So, L.Y.S. Lee, Stabilizer-Free Bismuth Nanoparticle for Selective Polyol Electrooxidation, *iScience*, **2021**, 102342
5. W. Zheng,[#] Y. Li,[#] M. Liu, L.Y.S. Lee, Few-Layer Tellurium: Cathodic Exfoliation and Doping for Collaborative Hydrogen Evolution, *Small*, **2021**, 2007768 [Featured as the Front Cover](#)
6. J. Choi,[#] D. Kim,[#] W. Zheng, B. Yan, Y. Li, L.Y.S. Lee, Y. Piao, Interface Engineered NiFe₂O_{4-x}/NiMoO₄ Nanowire Arrays for Electrochemical Oxygen Evolution, *Applied Catalysis B: Environmental*, **2021**, 286, 119857
7. L. Hu,[#] Y. Li,[#] X. Peng, W. Zheng, L.Y.S. Lee, P.K. Chu, K.-Y. Wong, TiO₂ Film Supported by Vertically Aligned Gold Nanorod Superlattice Array for Enhanced Photocatalytic Hydrogen Evolution, *Chemical Engineering Journal*, **2021**, 127900
8. W. Zheng, M. Liu, L.Y.S. Lee, Best Practices in Using Foam-Type Electrodes for Electrocatalytic Performance Benchmark, *ACS Energy Letters*, **2020**, 5, 3260 - 3264
9. L. Hu, Y. Li, W. Zheng, Y.-K. Peng, S.C.E. Tsang, L.Y.S. Lee, K.-Y. Wong, Blue Order/Disorder Janus-Type TiO₂ Nanoparticles for Enhanced Photocatalytic Hydrogen Generation, *Journal of Materials Chemistry A*, **2020**, 8, 22828 - 22839
10. W. Zheng,[#] J. Lee,[#] Z. Gao, Y. Li, S. Lin, S. P. Lau, L.Y.S. Lee, Laser-assisted Ultrafast Exfoliation of Black Phosphorus in Liquid with Tunable Thickness for Li-ion Batteries, *Advanced Energy Materials*, **2020**, 10, 1903490 [Featured as the Front Cover](#)
11. X. Zhang,[#] K.-A Min,[#] W. Zheng, J. Hwang, B. Han, L.Y.S. Lee, Copper Phosphosulfides as a Highly Active and Stable Photocatalyst for Hydrogen Evolution Reaction, *Applied Catalysis B: Environmental*, **2020**, 273, 118927
12. W. Zheng,[#] M. Liu,[#] L.Y.S. Lee, Electrochemical Instability of Metal-Organic Frameworks: In Situ Spectro-electrochemical Investigation of the Real Active Sites, *ACS Catalysis*, **2020**, 20, 81 - 92 [Highly cited paper, Clarivate](#)
13. W. Zheng, C.-S. Tsang, M. Liu, L.Y. So, L.-C. Leung, L.Y.S. Lee, Highly Efficient Stepwise Electrochemical Degradation of Antibiotics in Water by *in situ* Formed Cu(OH)₂ Nanorods, *Applied Catalysis B: Environmental*, **2019**, 256, 117824
14. Z. Gao, M. Liu, W. Zheng, X. Zhang, L.Y.S. Lee, Surface Engineering of MoS₂ *via* Laser-induced Exfoliation in Protic Solvents, *Small*, **2019**, 15, 1903791
15. Z. Gao, W. Zheng, L.Y.S. Lee, Highly Enhanced Pseudocapacitive Performance of Vanadium-doped MXenes in Neutral Electrolytes, *Small*, **2019**, 15, 1902649
16. W. Zheng, Y. Li, L.Y.S. Lee, Insights into the Transition Metal Ion-mediated Electrooxidation of Glucose in Alkaline Electrolyte, *Electrochimica Acta*, **2019**, 308, 9-19
17. W. Zheng,[#] C.-S. Tsang,[#] L.Y.S. Lee, K.-Y. Wong, Two-dimensional Metal-Organic Framework and Covalent-Organic Framework: Synthesis and their Energy-related Applications, *Materials Today Chemistry*, **2019**, 12, 34-60 ([Review article](#))
18. W. Zheng, Y. Li, L. Hu, L.Y.S. Lee, Use of Carbon Supports with Copper Ion as a Highly Sensitive Non-Enzymatic Glucose Sensor, *Sensors & Actuators B: Chemical*, **2019**, 282, 187-196
19. M. Liu, W. Zheng, S. Ran, S.T. Boles, L.Y.S. Lee, Overall Water Splitting Electrocatalysts based on 2D CoNi Metal-Organic Frameworks and Its Derivative, *Advanced Materials Interfaces*, **2018**, 5, 1800849 [Featured as the Inside Cover](#)
20. Y. Li, L. Hu, W. Zheng, X. Peng, M. Liu, P. K. Chu, L. Y. S. Lee, Ni/Co-Based Nanosheet Arrays for Efficient Oxygen Evolution Reaction, *Nano Energy*, **2018**, 52, 360-368
21. W. Zheng,[#] Y. Li,[#] M. Liu, C.-S. Tsang, L.Y.S. Lee, K.-Y. Wong, Cu²⁺-doped Carbon Nitride/MWCNT as an Electrochemical Glucose Sensor, *Electroanalysis*, **2018**, 30, 1446-1454
22. W. Zheng, Y. Li, C.-S. Tsang, L. Hu, M. Liu, B. Huang, L.Y.S. Lee, K.-Y. Wong, Cu^{II}-mediated Ultra-efficient Electrooxidation of Glucose, *ChemElectroChem*, **2017**, 4, 2788-2792

23. W. Zheng, H.W. Man, L. Ye, S.C.E. Tsang, Electroreduction of Carbon Dioxide to Formic Acid and Methanol over a Palladium/Polyaniline Catalyst in Acidic Solution: A Study of the Palladium Size Effect, *Energy Technology*, **2017**, 5, 937-944
24. A. Kolpin, G. Jones, S. Jones, W. Zheng, J. Cookson, A. PE York, P. J Collier, S.C.E. Tsang, Quantitative Differences in Sulfur Poisoning Phenomena over Ruthenium and Palladium: An Attempt to Deconvolute Geometric and Electronic Poisoning Effects Using Model Catalysts, *ACS Catalysis*, **2017**, 7, 592-605
25. W. Zheng, S. Nayak, W. Yuan, Z. Zeng, X. Hong, K.A. Vincent, S.C.E. Tsang, A Tunable Metal-polyaniline Interface for Efficient Carbon Dioxide Electro-Reduction to Formic Acid and Methanol in Aqueous Solution, *Chemical Communications*, **2016**, 52, 13901-13904
26. W. Zheng, L. Hu, L.Y.S. Lee, K.-Y. Wong, Copper Nanoparticles/Polyaniline/Graphene Composite as a Highly Sensitive Electrochemical Glucose Sensor, *Journal of Electroanalytical Chemistry*, **2016**, 781, 155-160
27. W. Zheng, J. Qu, X. Hong, K. Tedsree, S.C.E. Tsang, Probing the Size and Shape Effects of Cubic- and Spherical-Shaped Palladium Nanoparticles in the Electrooxidation of Formic Acid, *ChemCatChem*, **2015**, 7, 3826-3831
28. S. Jones, S.M. Fairclough, M. Gordon-Brown, W. Zheng, A. Kolpin, B. Pang, W.C.H. Kuo, J.M. Smith, S.C.E. Tsang, Dual Doping Effects (Site Blockage and Electronic Promotion) Imposed by Adatoms on Pd Nanocrystals for Catalytic Hydrogen Production, *Chemical Communications*, **2015**, 51, 46-49
29. K. Nakagawa, T. Jia, W. Zheng, S. M. Fairclough, M. Katoh, S. Sugiyama, S.C.E. Tsang, Enhanced Photocatalytic Hydrogen Evolution from Water by Niobate Single Molecular Sheets and Ensembles, *Chemical Communications*, **2014**, 50, 13702-13705
30. W. Zheng, S. Jones, X. Hong, S.C.E. Tsang, Photo and Electronic Excitation for Low Temperature Catalysis Over Metal Nanoparticles Using an Organic Semiconductor, *RSC Advances*, **2014**, 4, 47488-47496
31. J. Ge, Z. Zeng, F. Liao, W. Zheng, X. Hong, S.C.E. Tsang, Palladium on Iron Oxide Nanoparticles: the Morphological Effect of the Support in Glycerol Hydrogenolysis, *Green Chemistry*, **2013**, 15, 2064-2069
32. F. Liao, Y. Huang, J. Ge, W. Zheng, K. Tedsree, P. Collier, X. Hong, S.C.E. Tsang, Morphology-dependent Interactions of ZnO with Cu Nanoparticles at the Materials Interface in Selective Hydrogenation of CO₂ to CH₃OH, *Angewandte Chemie International Edition*, **2011**, 50, 2162-2165
33. Y. Huang, F. Liao, W. Zheng, X. Liu, X. Wu, X. Hong, S.C.E. Tsang, Temperature and Solvent-dependent Morphological Sol-Gel Transformation: an *in-situ* Microscopic Observation, *Langmuir*, **2010**, 26, 3106-3114

BOOK CHAPTERS

1. W. Zheng, Y. Li, L.Y.S. Lee, Earth-Abundant Metal-Based Nanomaterials for Electrochemical Water Splitting, in title "Functional Nanomaterials: Synthesis, Properties and Applications", Wiley-VCH, **2021**

PATENTS

1. S.C.E. Tsang, W. Zheng, X. Hong, Synthesis and Application of Visible Light-responsive Metal-Organic Semiconductor Photocatalyst
Chinese patent: CN103406152B Granted 2015

ACADEMIC ACTIVITIES

- (invited) Laser-Assisted Exfoliation of Black Phosphorus with Thickness Control for Li-Ion Batteries, ECS Meeting Abstracts, **Nov.**, **2020**
- 5th International Summer School Spectroelectrochemistry, Leibniz Institute for Solid State and Materials Research (IFW), Dresden, Germany, **Sep.**, **2019**
- Workshop on Bruker™ Surface Probe Microscope, Guangzhou, China, **Dec.**, **2018**
- Oral report: CO₂ Electroreduction Using Metal/Conductive Polymer Composite, The 15th National Youth Conference on Catalysis, China, **July**, **2015**
- Poster: Pd/Polythiophene as Photocatalyst for Environmental VOCs Decomposition, iChemE: Progress & Challenges in Environmental Catalysis, United Kingdom, **June**, **2014**

FUNDINGS

- *Design of High-efficient and High-selective Photoelectrochemical CO₂ Reduction Catalyst* 2018 - 2020
Science Foundation of Shenzhen (JCYJ20170818105046904) Co-P.I.
- *Synthesis and Tuning of Cu/ZnO Nanocrystal Interfaces for Catalytic CO₂ Reduction* 2012 - 2015
National Natural Science Foundation of China (21373153) Co-P.I.

MEMBERSHIP OF PROFESSIONAL SOCIETIES

Chinese Chemical Society (CCS)	Since 2012
International Society of Electrochemistry (ISE)	Since 2019

TECHNICAL STRENGTHS

Data Analysis & Visualization	OriginLab, R-based language, Adobe Illustrator
Academic Software	ChemBioOffice, Crystal Maker, Cinema4D, L ^A T _E X, Blender
Techniques	AFM (Bruker Certified SPM Operator), STM, Electrochemistry (CV, LSV, EIS, FTacV), XRD, TEM, SEM, FTIR <i>in-situ</i> electrochemical UV-Vis spectroscopy
Language	Chinese (native), English (fluent)

ACADEMIC SERVICE

Reviewer for some peer-reviewed journals, including: *Communications Chemistry*, *Sensors and Actuators B: Chemical*.

REFEREES

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