

# WEIXIN HUANG

Department of Chemistry, University of North Dakota

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## PROFESSIONAL EXPERIENCE

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University of North Dakota	GRAND FORKS, ND
Assistant Professor	01/2023-present
Washington State University	PULLMAN, WA
Postdoctoral associate in Chemical Engineering	11/2020-12/2022
Stanford University	PALO ALTO, CA
Postdoctoral associate in Chemical Engineering	01/2018-10/2020

## EDUCATION

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University of Notre Dame	NOTRE DAME, IN
Ph. D. in Chemistry	08/2012-12/2017
South China University of Technology	GUANGDONG, CHINA
M.S. in Chemical Engineering	09/2007-06/2010
Southwest University of Science and Technology	SICHUAN, CHINA
B.S. in Applied Chemistry	09/2003-06/2007
(Graduate with honors)	

## WORK EXPERIENCE

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Procter & Gamble	GUANGDONG, CHINA
Project Manager in Engineering Department	08/2010-06/2012

## HONORS & AWARDS

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Chinese Government Award for Outstanding Self-Financed Students Abroad	2018
China Scholarship Council (1:200 award rate)	
The Graduate Student Union (GSU) Conference Presentation Travel Award,	
University of Notre Dame	2015

Outstanding Student Scholarship (Grade 1, three times), South China University of Technology	2007-2010
Outstanding Graduate Student of Sichuan Province	2007
Outstanding Graduate Student of Southwest University of Science and Technology	2007
National Scholarship of China	2005

## RESEARCH EXPERIENCE

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University of North Dakota, Assistant professor

- Precision synthesis of nanomaterials for conversion of CO<sub>2</sub> to fuels.
- Precision synthesis of nanomaterials for conversion of plastics to fuels.
- Understand the surface evolution of catalysts under reaction conditions.

Washington State University, Postdoctoral associate

- Advisor: Prof. Yong Wang
  - Develop efficient catalysts to convert a bio-based chemical to a value-added fuel blendstock.
  - Develop efficient catalysts for automobile emission control and aim to reduce the amount of platinum group metals in the converter systems by about three or four times.

Stanford University, Postdoctoral associate

- Advisor: Prof. Matteo Cargnello
  - Design, synthesize and test hydrocarbon combustion catalysts that show complete combustion at rates 10 times larger than current state-of-the-art materials under realistic conditions.
  - Design experiments to determine reaction kinetics and mechanisms.
  - Evaluate the incorporation of these catalysts into prototype devices.

University of Notre Dame, Research Assistant

- Advisor: Prof. Sylwia Ptasińska and Prof. Ian Carmichael
  - In-situ/operando XPS studies of hybrid perovskite under environmental conditions
  - Low-temperature transformation of methane to methanol and acetic acid

## PUBLICATIONS (+ indicates these authors contributed equally; \* indicates corresponding authors)

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1. **W. Huang**, A. C. Johnston-Peck, T. Wolter, W. D. Yang, L. Xu, J. Oh, B. A. Reeves, C. Zhou, M. E. Holtz, A. A. Herzing, A. M. Lindenberg, M. Mavrikakis and M. Cargnello\*. Steam-

- created grain boundaries for methane C–H activation in palladium catalysts, *Science*, 2021, 373, 1518-1523.
2. **W. Huang**, X. Zhang, A. Yang, E. D. Goodman, K. Kao and M. Cargnello\*. Enhanced transient activity for methane combustion through in-situ H<sub>2</sub>O removal. *ACS Catalysis*, 2020, 10, 8157–8167.
  3. Y. Wang\*, C. Niu, Y. Zhu, D. He, and **W. Huang (co-corresponding author)\***. Tunable Syngas Formation from Electrochemical CO<sub>2</sub> Reduction on Copper Nanowire Arrays. *ACS Applied Energy Materials*, 2020, 3, 9841–9847.
  4. P. Losch<sup>+</sup>, **W. Huang(co-first author)<sup>+</sup>**, E. D. Goodman, C. J. Wrasman, A. Holm, A. R. Riscoe, J. A Schwalbe and M. Cargnello\*. Colloidal nanocrystals for heterogeneous catalysis. *Nano Today*, 2019, 24, 15-47. (*Review article*)
  5. **W. Huang<sup>+</sup>**, E. D. Goodman<sup>+</sup>, P. Losch and M. Cargnello\*. Deconvoluting Transient Water Effects on the Activity of Pd Methane Combustion Catalysts. *Industrial & Engineering Chemistry Research*, 2018, 57, 10261-10268.
  6. **W. Huang<sup>+</sup>,\***, S. J. Yoon<sup>+,\*</sup> and P. Sapkota. Effect of Light Illumination on Mixed Halide Lead Perovskites: Reversible or Irreversible Transformation. *ACS Applied Energy Materials*, 2018, 1, 2859-2865.
  7. **W. Huang**, S. Sadhu, P. Sapkota and S. Ptasinska\*. *In Situ* Identification of Cation-Exchange-Induced Reversible Transformations of 3D and 2D Perovskites. *Chemical Communications*, 2018, 54, 5879-5882.
  8. **W. Huang<sup>+</sup>**, Y. Wang<sup>+</sup> and S. K. Balakrishnan\*. Controllable Transformation Between 3D and 2D Perovskites through Cation Exchange. *Chemical Communications*, 2018, 54, 7944-7947.
  9. **W. Huang**, S. Sadhu and S. Ptasinska\*. Heat- and Gas-Induced Transformation in CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Perovskites and Its Effect on the Efficiency of Solar Cells. *Chemistry of Materials*, 2017, 29, 8478–8485.
  10. **W. Huang**, S. Zhang, Y. Tang, Y. Li, L. Nguyen, Y. Li, J. Shan, D. Xiao, R. Gagne, A. I. Frenkel and F. Tao\*. Low-Temperature Transformation of Methane to Methanol on Pd<sub>1</sub>O<sub>4</sub> Single Sites Anchored on the Internal Surface of Microporous Silicate. *Angewandte Chemie International Edition*, 2016, 55, 13441–13445.
  11. **W. Huang**, J. S. Manser, S. Sadhu, P. V. Kamat and S. Ptasinska\*. Direct Observation of Reversible Transformation of CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> and NH<sub>4</sub>PbI<sub>3</sub> Induced by Polar Gaseous Molecules. *Journal of Physical Chemistry Letters*, 2016, 7, 5068–5073.
  12. **W. Huang**, J. S. Manser, P. V. Kamat and S. Ptasinska\*. Evolution of Chemical Composition, Morphology, and Photovoltaic Efficiency of CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Perovskite under Ambient Conditions. *Chemistry of Materials*, 2016, 28, 303–311.

13. **W. Huang** and S. Ptasińska\*. Functionalization of Graphene by Atmospheric Pressure Plasma Jet in air or H<sub>2</sub>O<sub>2</sub> Environments. *Applied Surface Science*, 2016, 367, 160–166.
14. **W. Huang**, Y. Chen, C. Yang, Y. Situ, and H. Huang\*. pH-Driven Phase Separation: Simple Routes for Fabricating Porous TiO<sub>2</sub> Film with Superhydrophilic and Anti-Fog Properties, *Ceramics International*, 2015, 41, 7573–7581.
15. J. Shan<sup>+</sup>, **W. Huang (co-first author)**<sup>+</sup>, L. Nguyen<sup>+</sup>, Y. Yu, S. Zhang, Y. Li, A. I. Frenkel and F. Tao\*. Conversion of Methane to Methanol with a Bent Mono( $\mu$ -oxo)nickel Anchored on the Internal Surfaces of Micropores. *Langmuir*, 2014, 30, 8558–8569.
16. **W. Huang**, W. Deng, M. Lei and H. Huang\*. Superhydrophilic Porous TiO<sub>2</sub> Film Prepared by Phase Separation through Two Stabilizers, *Applied Surface Science*, 2011, 257, 4774–4780.
17. **W. Huang**, M. Lei, H. Huang\*, J. Chen and H. Chen. Effect of Polyethylene Glycol on Hydrophilic TiO<sub>2</sub> Films: Porosity-Driven Superhydrophilicity, *Surface & Coatings Technology*, 2010, 202, 3954–3961.
18. H. N. Pham, A. DeLaRiva, E. J. Peterson, R. Alcalá, K. Khivantsev, J. Szanyi, X. S. Li, D. Jiang, **W. Huang**, Y. Sun, P. Tran, Q. Do, C. L. DiMaggio, Y. Wang\*, and A. K. Datye\*. Designing Ceria/Alumina for Efficient Trapping of Platinum Single Atoms. *ACS Sustainable Chemistry & Engineering*, 2022, 10, 23, 7603–7612.
19. K. Kao, A. Yang, **W. Huang**, C. Zhou, E. D. Goodman, A. Holm, C. W. Frank and M. Cargnello\*, A General Approach for Monolayer Adsorption of High Weight Loadings of Uniform Nanocrystals on Oxide Supports, *Angewandte Chemie International Edition*, 2021, 60, 7971–7979.
20. Z. Wu, X. Zhang, E. D. Goodman, **W. Huang**, A. R. Riscoe, S. Yacob, and M. Cargnello\*. The Dynamics of Copper-Containing Porous Organic Framework Catalysts Reveal Catalytic Behavior Controlled by Polymer Structure, *ACS Catalysis*, 2020, 10, 9356–9365.
21. P. Losch, **W. Huang**, O. Vozniuk, E. D. Goodman, W. Schmidt and M. Cargnello\*. Modular Pd/Zeolite Composites Demonstrating the Key Role of Support Hydrophobic/Hydrophilic Character in Methane Catalytic Combustion. *ACS Catalysis*, 2019, 9, 4742–4753.
22. Y. Tang<sup>+</sup>, Y. Li<sup>+</sup>, V. Fung<sup>+</sup>, D. Jiang, **W. Huang**, S. Zhang, Y. Iwasawa, T. Sakata, L. Nguyen, X. Zhang, A. Frenkel and F. Tao\*. Single rhodium atoms anchored in micropores for efficient transformation of methane under mild condition, *Nature Communications*, 2018, 9, 1231.
23. C. Liu, Y. Chen, **W. Huang**, Y. Situ and H. Huang\*. Birnessite manganese oxide nanosheets assembled on Ni foam as high-performance pseudocapacitor electrodes: Electrochemical oxidation driven porous honeycomb architecture formation. *Applied Surface Science*, 2018, 458, 10–17.
24. A. R. Milosavljevic, D. Bozanic, S. Sadhu, N. Vukmirovic, R. Dojcilovic, P. Sapkota, **W.**

- Huang**, J. D. Bozek, C. Nicolas, L. Nahon and S. Ptasinska\*. Electronic Properties of Free-Standing Surfactant-Capped Lead Halide Perovskite Nanocrystals Isolated in Vacuo, *Journal of Physical Chemistry Letters*, 2018, 9, 3604-3611.
25. J. Yang, Y. Pang, **W. Huang**, S. K. Shaw, J. Schiffbauer, M. A. Pillers, X. Mu, S. Luo, T. Zhang, Y. Huang, G. Li, S. Ptasinska\*, M. Lieberman and T. Luo. Functionalized Graphene Enables Highly Efficient Solar Thermal Steam Generation. *ACS Nano*, 2017, 11, 5510–5518.
26. A. Milosavljevic\*, **W. Huang**, S. Sadhu and S. Ptasinska. Low-Energy Electron-Induced Transformations in Organolead Halide Perovskite. *Angewandte Chemie International Edition*, 2016, 55, 10083–10087.
27. F. Tao\*, J. Shan, L. Nguyen, Z. Wang, S. Zhang, L. Zhang, Z. Wu, **W. Huang**, S. Zeng and P. Hu\*. Understanding Complete Oxidation of Methane on Spinel Oxides at a Molecular Level. *Nature Communications*, 2015, 6, 7798.
28. S. Zhang<sup>+</sup>, L. Nguyen<sup>+</sup>, J. Liang<sup>+</sup>, J. Shan, J. Liu, A. I. Frenkel, A. Patlolla, **W. Huang**, J. Li\* and F. Tao\*. Catalysis on Singly Dispersed Bimetallic Sites, *Nature Communications*, 2015, 6, 7938.
29. Y. Chen, C. Zhang, **W. Huang**, Y. Situ\* and H. Huang\*. Multimorphologies Nano-ZnO Preparing through a Simple Solvothermal Method for Photocatalytic Application. *Materials Letters*, 2015, 141, 294–297.
30. Y. Chen, C. Zhang, **W. Huang**, C. Yang, T. Huang, Y. Situ\* and H. Huang\*. Synthesis of Porous ZnO/TiO<sub>2</sub> Thin Films with Superhydrophilicity and Photocatalytic Activity via a Template-Free Sol–Gel Method. *Surface and Coatings Technology*, 2014, 15, 258, 531–538.
31. Y. Situ, T. Huang, Y. Chen, **W. Huang** and H. Huang\*. Polymerization-Induced Phase Separation in the Preparation of Macroporous TiO<sub>2</sub>/SiO<sub>2</sub> Thin Films. *Ceramics International*, 2014, 40, 919–927.
32. Y. Chen, **W. Huang**, D. He, Y. Situ\* and H. Huang\*. Construction of Heterostructured g-C<sub>3</sub>N<sub>4</sub>/Ag/TiO<sub>2</sub> Microspheres with Enhanced Photocatalysis Performance under Visible-Light Irradiation. *ACS Applied Materials & Interfaces*, 2014, 6, 14405–14414.
33. C. Yang, **W. Huang**, T. Huang and H. Huang\*. Preparation and Formation Mechanism of Superhydrophilic Porous TiO<sub>2</sub> Films Using Complexing Agents as Pore-Forming Materials, *Science of Advanced Materials*, 2014, 6, 9-17.
34. S. Zhang, J. Shan, Y. Zhu, L. Nguyen, **W. Huang**, H. Yoshida, S. Takeda, and F. Tao\*. Restructuring Transition Metal Oxide Nanorods for 100% Selectivity in Reduction of Nitric Oxide with Carbon Monoxide. *Nano Letters*, 2013, 13, 3310–3314.
35. S. Zhang<sup>+</sup>, J. Shan<sup>+</sup>, Y. Zhu<sup>+</sup>, A. I. Frenkel, A. Patlolla, **W. Huang**, S. J. Yoon, L. Wang, H. Yoshida, S. Takeda and F. Tao\*. WGS Catalysis and In Situ Studies of CoO<sub>1-x</sub>, PtCo<sub>n</sub>/Co<sub>3</sub>O<sub>4</sub>,

and  $\text{Pt}_m\text{Co}_m'/\text{CoO}_{1-x}$  Nanorod Catalysts. *Journal of the American Chemical Society*, 2013, 135, 8283–8293.

36. B. T. Sneed, C. N. Brodsky, C. Kuo, L. K. Lamontagne, Y. Jiang, Y. Wang, F. Tao, **W. Huang** and C. Tsung\*. Nanoscale-Phase-Separated Pd–Rh Boxes Synthesized via Metal Migration: An Archetype for Studying Lattice Strain and Composition Effects in Electrocatalysis. *Journal of the American Chemical Society*, 2013, 135, 14691–14700.
37. T. Huang, **W. Huang**, C. Zhou, Y. Situ and H. Huang\*. Superhydrophilicity of  $\text{TiO}_2/\text{SiO}_2$  Thin Films: Synergistic Effect of  $\text{SiO}_2$  and Phase-Separation-Induced Porous Structure. *Surface & Coatings Technology*, 2012, 213, 126–132.

**Total citations = 3146** (Google Scholar, as of 11/15/2022).

## PRESENTATIONS

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1. **W. Huang**, Y. Li, and Y. Wang. Engineering Catalyst Supports to Anchor Pt Clusters with High Thermal Stability for Hydrocarbon Oxidation (Oral presentation). The 27th North American Catalysis Society Meeting, **May. 2022**, New York City, NY.
2. **W. Huang** and M. Cargnello. Deconvoluting Transient Water Effects on the Activity of Pd Methane Combustion Catalysts (Oral presentation). AIChE Annual Meeting, **Nov. 2019**, Orlando, FL.
3. **W. Huang** and S. Ptasinska. The Transformations of Hybrid Perovskite Solar Cells under Environmental Conditions (Oral presentation). 21<sup>st</sup> GLCACS conference, **Jun. 2017**, Evanston, IL.
4. **W. Huang** and S. Ptasinska. Evolution of Chemo-structural Composition of  $\text{CH}_3\text{NH}_3\text{PbI}_3$  Perovskite under Ambient Conditions (Poster presentation). 2nd Annual APXPS Workshop, **Dec. 2015**, Berkeley, CA.
5. **W. Huang** and S. Ptasinska. Functionalization of Graphene by Atmospheric Pressure Plasma Jet (Poster presentation). APS Fall Prairie Section Meeting, **Nov. 2015**, Notre Dame, IN.
6. **W. Huang** and S. Ptasinska. Functionalization of Graphene by Atmospheric Pressure Plasma Jet (Poster presentation). AVS Prairie Chapter Symposium, **Sep. 2015**, Notre Dame, IN.
7. **W. Huang** and S. Ptasinska. Functionalization of Graphene by Atmospheric Pressure Plasma Jet (Oral presentation). Gordon Research Conference (GRC) and Gordon Research Seminar (GRS): Chemical Reactions at Surfaces, **Feb. 2015**, Ventura, CA.

## SERVICE AND ACTIVITIES

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**Journal Reviewer:** Nature Communications, ACS Catalysis, Chemical Engineering Journal, Applied Catalysis A: General, Catalysts, Molecular Catalysis, Catalysis Today, Journal of Physical Chemistry A, Materials, Nanomaterials, Ceramics International, Applied Surface Science, Journal of Physics and Chemistry of Solids, Materials Letters, Micro & Nano Letters, Nanomaterials and Nanotechnology, IET renewable power generation, Applied Sciences

**Certificates:** 2018 Outstanding Contribution in Reviewing for Materials Letters

2017 Outstanding Contribution in Reviewing for Materials Letters

2017 Outstanding Contribution in Reviewing for Applied Surface Science

2016 Outstanding Contribution in Reviewing for Ceramics International

## **INTELLECTUAL PROPERTY**

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1. **W. Huang** and M. Cargnello. Promoting catalytic activity through stream treatment-induced nanoparticle restructuring, US Patent, submitted.