CHAO GUAN

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Academic Careers

Postdoc Research Associate, From May 2022 To Current
Oak Ridge National Laboratory – Oak Ridge, USA

- Polymer Upcycling

Postdoc Research Associate, From September 2020 To May 2022
University of Connecticut – Storrs, USA

- Synthesis and characterization of conjugated polymers
- Lab equipment maintenance and training
- Mentoring Ph.D. students
- Weekly reports, ordering and lab inventory

Research Scientist, From October 2019 To August 2020
The University of New Mexico – Albuquerque, USA

- Synthesis and characterization of conjugated polymers
- Lab equipment maintenance and training
- Lab safety officer

Research Assistant, From August 2011 To August 2012
Hubei Polytechnic University – Huangshi, China

- Synthesis of 2-Hydroxy-4-methoxybenzophenone-5-sulfonic acid
- Quality control

Education

Ph.D.: Chemical Science, From August 2015 To October 2019
King Abdullah University of Science and Technology (KAUST) - Jeddah, Saudi Arabia

Master of Science: Polymer Chemistry, From September 2012 To July 2015
Ningbo University - Ningbo, China

Bachelor of Engineering: Chem. Engineering and Technology, From September 2007 To July 2011
Hubei Polytechnic University - Huangshi, China

Technical expertise

- Organic and Organometallics synthesis
- Air-free Techniques
- Column Chromatography Techniques
- Spectroscopy (FTIR, UV-Vis, NMR)
- Chromatography (HPLC, GC, GPC)
- Mechanical Testing (Rheology)

- Polymerization and Post-polymerization modification
- Office Suite and Chemistry software
- Thermal Analyses (DSC, TGA)
- Mass spectrometry (LC/GC-MS)
- Others (XRD, BET, Laser Flash Photolysis)

Research interests

Polymer Upcycling; Conjugated polymers; Organometallic catalysis; Organic synthesis; CO_2 utilization; Hydrogen storage

Publications

1. **Guan, C.**; Pan, Y.; Zhang, T.; Ajitha, M. J.; Huang, K.-W., An update on Formic Acid dehydrogenation by homogeneous catalysis. **Chem. Asian J. 2020**, 15, 937-946.
2. **Guan, C.**; Zhang, D.-D.; Zhang, T.; Huang, M-H.; Chakraborty, P.; Li, H.; Yao, C.; Zhou, C.; Hu, J.; Huang, K.-W., Computationally guided design of a new Rh catalyst for selective Formic Acid dehydrogenation: validation with caution. **Int. J. Hydrog. Energy 2019**, 44, 28421-28429.
3. **Guan, C.**; Pan, Y.; Ang, E.; Hu, J.; Yao, C.; Huang, M.-H.; Li, H.; Lai, Z., Huang, K.-W., Conversion of CO_2 from air into formate using amines and Phosphorus-Nitrogen PN^3P-Ru (II) pincer complexes. **Green Chem. 2018**, 20, 4201-4205.
4. **Guan, C.**; Zhang, D.-D.; Pan, Y.; Iguchi, M.; Ajitha, M. J.; Hu, J.; Li, H.; Yao, C.; Huang, M.-H.; Min, S.; Zheng, J.; Himeda, Y.; Kawanami, H.; Huang, K.-W., Dehydrogenation of Formic Acid catalyzed by a Ruthenium complex with an N, N'-diimine ligand. **Inorg. Chem. 2017**, 56, 438-445.
5. **Guan, C.**; Yang, H.; Li, W.; Zhou, D.; Xu, J.; Chen, Z. R., Crystallization behavior of ultrahigh-molecular-weight polyethylene/polyhedral oligomeric silsesquioxane nanocomposites prepared by ethylene in situ polymerization. **J. Appl. Polym. Sci. 2014**, 131, 40847.
6. Duttaa, I.; Alobaida, A. Nasser.; Menicucci, L. F.; Chakraborty, P.; **Guan, C.;** Han, D.; Huang, K.-W. Dehydrogenation of formic acid mediated by a Phosphorus–Nitrogen PN^3P-manganese pincer complex: Catalytic performance and mechanistic insights. **Int. J. Hydrog. Energy 2022,** Doi.org/10.1016/j.ijhydene.2022.04.220
7. Duan, H.; **Guan, C**.; Xue, J.; Malesky,T.; Luo, Y.; Lin, Y.; Qin, Y.; He.J. Facile synthesis of water-dispersible poly (3-hexylthiophene) nanoparticles with high yield and excellent colloidal stability. **iScience** 25, 104220.
8. Chen, C.; Alalouni, R. M.; Dong, X; Cao, Z; Cheng, Q,; Zheng, L.; Meng, L.; **Guan, C.**; Liu, L.; Abou-Hamad, E.; Wang, J.; Shi, Z.; Huang, K.-W.; Cavallo, L.; Han, Y., Highly Active Heterogeneous Catalyst for Ethylene Dimerization Prepared by Selectively Doping Ni on the Surface of a Zeolitic Imidazolate Framework. **J. Am. Chem. Soc. 2021**, 143, 18, 7144–7153.
9. Katba-Badera M. Y., **Guan C.**, Qin, Y. Regio-Regular and Cross-Conjugated Poly(thienylene vinylene)s through Acyclic Diene Metathesis (ADMET). **J Polym Sci A Polym Chem., Accepted, 2021**
10. Katba-Badera M. Y., Meng, L., **Guan C.**, Qin, Y. Regio-regular poly(thienylene vinylene)s (rr-PTVs) through acyclic diene metathesis (ADMET) polymerization and the impact of alkyl side-chains on polymer molecular weight and solubility. **Polymer 2021**, 231, 124150.

11. Iguchi, M.; **Guan, C.**; Huang, K.-W.; Kawanami, H., Solvent effects on high-pressure hydrogen gas generation by dehydrogenation of Formic Acid using Ruthenium complexes. **Int. J. Hydrog. Energy 2019**, 44, 28507-28513.
12. Pan, Y.; **Guan, C.**; Chakraborty, P.; Li, H.; Zhou, C.; Huang, K.-W., CO_2 Hydrogenation by Phosphorus–Nitrogen PN^3P-Pincer Iridium Hydride Complexes: Elucidation of the Deactivation Pathway. **Dalton Trans. 2019**, 48, 12812-12816.
13. Zhou, C.; Hu, J.; Wang, Y.; Yao, C.; Chakraborty, P.; Li, H.; **Guan, C.**; Huang, M.-H.; Huang, K.-W., Selective carbonylation of benzene to benzaldehyde using a phosphorus–nitrogen PN^3P–rhodium (I) complex. **Org. Chem. Front. 2019**. 6, 721-724.
14. Zhang, Y.; Chen, X.; Zheng, B.; Guo, X.; Pan, Y.; Chen, H.; Li, H.; Min, S.; **Guan, C.**; Huang, K.-W., Structural analysis of transient reaction intermediate in Formic Acid dehydrogenation catalysis using two-dimensional IR spectroscopy. **Proc. Natl. Acad. Sci. U.S.A. 2018**, 115, 12395-12400.
15. Wang, X.; Ling, E. A. P.; **Guan, C.**; Zhang, Q.; Wu, W.; Liu, P.; Zheng, N.; Zhang, D.; Lopatin, S.; Lai, Z.; Huang, K.-W., Single‐Site Ruthenium Pincer Complex Knitted into Porous Organic Polymers for Dehydrogenation of Formic Acid. **ChemSusChem 2018**, 11, 3591-3598.
16. Yao, C.; Chakraborty, P.; Aresu, E.; Li, H.; **Guan, C.**; Zhou, C.; Liang, L.-C.; Huang, K.-W., Monomeric nickel hydroxide stabilized by a sterically demanding phosphorus–nitrogen PN^3P-pincer ligand: synthesis, reactivity, and catalysis. **Dalton Trans. 2018**, 47, 16057-16065.
17. Alyami, N. M.; LaGrow, A. P.; Anjum, D. H.; **Guan, C.**; Miao, X.; Sinatra, L.; Yuan, D.-J.; Mohammed, O. F.; Huang, K.-W.; Bakr, O. M., Synthesis and characterization of branched fcc/hcp ruthenium nanostructures and their catalytic activity in ammonia borane hydrolysis. **Cryst. Growth Des. 2018**, 18, 1509-1516.
18. He, D.; Xu, J.; **Guan, C.**; Chen, Z.-R., Synthesis of disentangled Ultra-high molecular weight polyethylene and its application to enhancing the properties of linear low-density polyethylene. **Materials Reports 2016**, 30, 47-51.
19. Li, W.; Chen, T.; **Guan, C.**; Gong, D.; Mu, J.; Chen, Z.-R.; Zhou, Q., Influence of polyhedral oligomeric silsesquioxane structure on the disentangled state of ultrahigh molecular weight polyethylene nanocomposites during ethylene in situ polymerization. **Ind. Eng. Chem. Res. 2015**, 54, 1478-1486.
20. Xu J, Li W, Zhao C.-Z., **Guan, C.**; Chen, Z.-R., Emergence of Chain Entanglement of UHMWPE in "Semi-Dilute Solution". **Polym. Bull. 2015**, 07, 43-51.
21. Li, W.; **Guan, C.**; Xu, J.; Mu, J.; Gong, D.; Chen, Z.-R.; Zhou, Q., Disentangled UHMWPE/POSS nanocomposites prepared by ethylene in situ polymerization. **Polymer 2014**, 55, 1792-1798.
22. Li, W.; **Guan, C.**; Xu, J.; Chen, Z.-R.; Jiang, B.; Wang, J.; Yang, Y., Bimodal/broad polyethylene prepared in a disentangled state. **Ind. Eng. Chem. Res. 2014**, 53, 1088-1096.

Patents

1. Huang, K.-W., **Guan, C.**, Pan Y., Hu J., Li, H. Hydrogen generation from formic acid catalyzed by a metal complex under amine-free and aqueous condition. US 11014079; 2021.

2. Huang, K.-W. **Guan, C.**, Dutta, I. A class of recyclable self-assembled complexes for selective dehydrogenation of formic acid through metal-ligand cooperation. Appl. No. 63185006; Pending

Services and honors

Outstanding Reviewer for Journal of Saudi Chemical Society, September 2018

KAUST Scholarship, From August 2015 To October 2019

Academic conferences

1. International Student Energy Summit 2019, London, UK, 2019, July, Poster
2. New Challenges in Heterogeneous Catalysis, Jeddah, Saudi Arabia, 2018, January, Poster
3. Saudi-U.S. CEO forum-Partnerships for Generations, Riyadh, Saudi Arabia, 2017, May, Exhibition.
4. International Symposium on Polymer Chemistry, Shanghai, China, 2014, June, Poster