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BELFAST**

DOCTOR OF PHILOSOPHY

CO2 Capture and Utilization Using Dual-Functional Catalysts

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EDUCATION

- **Queen's University Belfast, UK (QS Ranking 173) PhD** Sep. 2016-Mar. 2020
Chemical Engineering Viva date: 19 March 2020
Project: CO₂ capture and utilization using multifunctional catalysts
- **University of Sydney, Australia Visiting student** Jan. 2018-Apr. 2018
- **China University of Petroleum, China MSc** Sep. 2014-Jun. 2017
State Key Laboratory of Heavy Oil Processing
Materials Engineering
Project: Preparation, scale up and catalytic applications of hierarchical ZSM-5 zeolite
- **Dalian Polytechnic University, China BSc** Sep. 2010-Jun. 2014
Materials Science and Engineering

RESEARCH INTERESTS AND SKILLS

- The development of novel sorbents for carbon capture and heterogeneous catalysts to produce sustainable fuels and chemicals from carbon-based feedstock.
- CO₂ in-situ capture during biomass gasification.
- Characterization techniques: fixed-bed reactor, BET, XRD, XAFS, XPS, XRF, ICP, SEM/EDX, TEM/HRTEM, FIB-SEM, TPD/TPR, In-situ FT-IR, GC, MS, TGA/DSC.
- Software: Office, Origin, Photoshop, Casa XPS, Material Studio, 3ds Max, Aspen simulation.

MAIN PUBLICATIONS

- **H. Sun, Y. Zhang, S. Guan, J. Huang, C. Wu.** Direct and highly selective conversion of captured CO₂ into methane through integrated carbon capture and utilization over dual functional materials. **Journal of CO₂ utilization.** 2020, 38: 262-272. Impact factor: 5.189.
- **H. Sun, J. Wang, J. Zhao, B. Shen*, J. Shi, J. Huang* and C. Wu*.** Dual functional catalytic materials of Ni over Ce-modified CaO sorbents for integrated CO₂ capture and conversion. **Applied Catalysis B-Environmental.** 2019, 244: 63-75. Impact factor: 14.229.
- **H. Sun, J. Wang, X. Liu, B. Shen*, C. M. A. Parlett*, G. O. Adward, E. J. Anthony*, P. T. Williams* and C. Wu*.** Fundamental studies of carbon capture using CaO-based materials. **Journal of Materials Chemistry A.** 2019, 7, 9977-9987. Impact factor: 10.733.
- **H. Sun, C. Wu*.** Auto-thermal CaO looping biomass gasification for Renewable Syngas Production. **Environmental Science & Technology,** 2019, 53: 9298-9305. Impact factor: 7.149.
- **H. Sun, C. M. A Parlett*, M. A Isaacs, X. Liu, G. Adwek, J. Wang, B. Shen*, J. Huang* and C. Wu*.** Development of Ca/KIT-6 adsorbents for high temperature CO₂ capture. **Fuel.** 2019, 235: 1070-1076. Impact factor: 5.128.
- **H. Sun, C. Wu*, B. Shen*, X. Zhang, Y. Zhang, J. Huang*.** Progress in the Development and Application of CaO-Based Adsorbents for CO₂ Capture-A Review. **Materials Today Sustainability.** 2018, 1: 1-27.
- **H. Sun, P. Peng, Y. Wang*, C. Li, F. Subhan, P. Bai, W. Xing, Z. Zhang, Z. Liu, Z. Yan*.** Preparation, scale-up and application of meso-ZSM-5 zeolite by sequential desilication-dealumination. **Journal of Porous Materials.** 2017, 24: 1513-1525.
- **F. Jin, H. Sun, C. Wu*, H. Ling, Y. Jiang, P. T. Williams*, J. Huang*.** Effect of calcium addition on Mg-AlO_x supported Ni catalysts for hydrogen production from pyrolysis-gasification of biomass. **Catalysis Today.** 2018, 309: 2-10.
- **X Liu, H Sun, C Wu*, D Patel, J Huang*.** Thermal Chemical Conversion of High-Density Polyethylene for the Production of Valuable Carbon Nanotubes Using Ni/AAO Membrane Catalyst. **Energy & Fuels.** 2017, 32: 4511-4520.
- **F Gao, J Huang, H Sun, J Hu*, M Wang*, J Mi, C Wu*.** CO₂ capture using mesocellular siliceous foam (MCF)-supported CaO. **Journal of the Energy Institute.** 2019, 92: 1591-1598.
- **C Quan, N Gao*, H Wang, H Sun, C Wu*, X Wang, Z Ma.** Ethanol steam reforming on Ni/CaO catalysts for coproduction of hydrogen and carbon nanotubes. **International Journal of Energy Research.** 2019, 43: 1255-1271.
- **Y. Zhang, D. Du, X. Li, H. Sun, L. Li, P. Bai, W. Xing*, Q. Xue, Z. Yan*.** Electrostatic self-Assembly of sandwich-Like CoAl-LDH/polypyrrole/graphene nanocomposites with enhanced capacitive performance. **ACS Applied Materials & Interfaces.** 2017, 9: 31699-31709.

WORKING EXPERIENCE

- EU Project Coordinator June.2019-Aug.2019
Outcomes: Worked as the coordinator for the communication between the partners and helped to prepare the proposal during the EU project application.

- Research and Innovation Staff Exchange Project Apr.2019-Aug.2019
H2020-MSCA-RISE-2018: Project 823745
Outcomes: Worked as the researcher in Dalian Institute of Chemical Physics, CAS, carried out the mechanism studies of dual functional catalysts and developed a direct method for the highly selectively conversion of captured CO₂.
- Teaching assistant Sep.2017-Mar.2018
Assisted lecturer to demonstrate students with their project and final design
Demonstrated chemistry lab lectures for 1st and 2nd undergraduate students

CONFERENCE

- **H. Sun, C. Wu***. 6th UK Catalysis Conference (UKCC), Loughborough, UK, 7th-9th Jan. 2020. Poster presentation, volunteer.
- **H. Sun, C. Wu***. 26th Annual SCI-CSCST Conference, London, UK, 04th -05th Sep. 2019. **Oral Award Supported by RSC Applied Catalysis.**
- **H. Sun, C. Wu***. 14th European Congress on Catalysis, Aachen, Germany, 18th-23rd Aug. 2019. Oral presentation.
- **H. Sun, C. Wu***. 12th ECCRIA-the European Conference on Fuel and Energy Research and its Applications, Cardiff, UK, 5th-7th Sep. 2018.
- **H. Sun, J. Huang*, C. Wu***. 2018 International Symposium on Advancement and Prospect of Catalysis Science & Technology, Sydney, Australia, 25th-27th July 2018. **Oral Award Supported by ACS Catalysis. Session Chair for early career researchers.**
- **H. Sun, Y. Wang*, Z. Yan***. 18th Chinese Zeolite Conference, Shanghai, China, 25th-28th Oct. 2015. **Oral presentation.**

AWARDS

- RSC Applied Catalysis Sponsored Oral Award, 2019.
- ACS Catalysis Award for Early Career Researcher, 2018.
- EU rise project for visiting student to the University of Sydney, 2018.
- China scholarship for overseas PhD students, 2016.
- National scholarship for postgraduates (Top 3%), 2015.
- Excellent graduates of Liaoning province (Top 5%), 2014.
- "Challenge Cup" college student academic science and technology competition, Second prize of Liaoning province (Top 5%), 2012.
- Government scholarship of Liaoning province (Top 5%), 2011.