

Binjian Nie BEng MEng PhD MRSC AMICheME FHEA**Departmental Lecturer** in Chemical Engineering**Group Lead** of [Energy Storage and Energy Carriers](#)**W:** <https://eng.ox.ac.uk/people/binjian-nie/> | **T:** +44(0)18657613077**Labs:** Institute of Advanced Technology, Begbroke Science Park, Begbroke, OX5 1PF.

Department of Engineering Science, University of Oxford.

Employment

02/2022 – 02/2027	Departmental Lecturer in Chemical Engineering	University of Oxford
09/2020 – 01/2022	T-ERA Senior Research Fellow	University of Birmingham
11/2017 - 08/2020	PDRA in Thermal Energy Storage	University of Birmingham
07/2012 - 09/2015	Assistant Technology Director	Sinopec Group

Qualifications

09/2015 - 07/2019	University of Birmingham	Chemical Engineering	PhD
<i>Thesis: A novel thermal energy storage-based cooling system, Supervised by Prof. Yulong Ding.</i>			
09/2005- 06/2012	Dalian University of Technology (Top 3 Chemical Engineering in China)	Chemical Engineering	MEng
<i>Thesis: Hydrothermal Synthesis of Layered Aluminosilicate Molecular Sieve for catalytic aromatization.</i>			

Grants

Year	Source	Name of grant held.	Role	Value (His Share Only)
2025-2026	ESPRC IAA	Workshop on Green Hydrogen and Ammonia	PI	£5.2k
2025-2027	HORIZON-MSCA	Synergistic integration and efficient operation of thermochemical energy storage-assisted magnesium hydrides-based hydrogen storage	Co-host PI	£261k
2026-2029	Saudi Aramco	Capital Equipment for Studentship	PI	£210k
2025-2026	EPSRC Reef-UKC	Efficient data centre cooling from renewable power using thermal energy storage	PI	£10k
2025-2027	EPSRC UK-HyRES Hub	Ammonia for Iron Reduction	Co-PI	£150k
2024-2025	ISPF	Low-pressure Ammonia production	PI	£160k
2024-2025	EPSRC IAA	Capital Equipment	PI	£26.9k
2024-2025	EPSRC IAA	Cold Storage based Warehouse	PI	£73k
2024-2026	EPSRC	Thermochemical Heating assisted Solid Hydrogen Storage	PI	£450k
2023-2024	EPSRC	Synergistic of Carbon Capture, Waste Heat Recovery and Fuel Production	PI	£100k
2023-2025	University Challenge Seed Fund	Low-cost Hydrogen Storage for Heating, Cooling and Power	PI	£246k
2023-2024	EPSRC and Henry Royce Institute	Calcium-looping-based High-Temperature Waste Heat Recovery	PI	£20k

2023-2024	Innovate UK	Solar Photovoltaic-Powered Cooling	PI	£300k
2022-2023	EPSRC IAA	Chemical Energy Storage of Renewables	PI	£6k
2023-2024	Australia's National Science Agency	CSIRO Hydrogen Fellowship for Dr Yuhan Huang	Host PI	AUD \$30k
2022-2023	Innovate UK	Affordable Solar Photovoltaic-Powered Cooling for Fish and Meat Storage	Oxford PI	£50k
2021-2022	Thermal Energy Accelerator	T-ERA Senior Research Fellow in Heating and Cooling	PI	£450k
2021	EPSRC Supergen Cross-hub	Off-shore Wind-powered Port Heating and Cooling (EP/SEC/1649379)	PI	£20k
2021	EPSRC Supergen Energy Networks	Decarbonization of Cooling by Thermal Energy Storage (EP/SEN/1002164)	PI	£5k
2020	IGI-UoB GCRF	International Cold Chain Roadmap	PI	£21.2k
2020	Industry (Jinhe Energy)	Cold energy storage Technologies	PI	£272k
2020	H2020-EU	Electro-Intrusion (101017858)	Co-I	€746k/3.65M
2019	UK-China Engineering Consortium	Early Career Researcher's Overseas Mobility (n.a.)	PI	£3k
2018	British Council	Cold Chain Roadmap in China (2019-RLWK11-10724)	Co-I	£17k

Project Experience(~£20M)

Year	Name of grant held (Funder).	Involvement
2020-2022	Decarbonisation of Low-Temperature process Heat Industry (EPSRC, EP/T022981/1)	Lead researcher
2019-2021	Joint UK-India Clean Energy Centre (EPSRC, EP/P003605/1)	Researcher
2019-2022	Active Building Centre-Thermochemical Energy Storage-based Heating (EPSRC, EP/S016627/1)	Lead researcher
2018-2021	Waste Heat Recovery using Thermal Energy Storage (Estrella, Spain n.a.)	Researcher
2017-2020	Road/rail Shipping Container for Cold Chain (CRRC)	Lead researcher
2016	Hubbard: Advanced Lightweight Cold Chain (Hubbard, n.a.)	Researcher
2015-2017	Cold Thermal Energy Storage-based Air Conditioner (CRRC)	Lead researcher

Prizes and Awards

Date	Award	Source
2026	Young Investigator Award	IGAE
2025	Recognition Award	Engineering Science, University of Oxford
2025	Energy & Fuels Rising Star	American Chemical Society
2024	Innovation Award	WSSET
2024	Nicklin Medal	ICHEME
2022	Highly Commended Award for Nicklin Medal	ICHEME
2019	Energy Award Finalist, IChemE 2019 Global Awards	ICHEME
2021	PERCAT Career Development Competition Award	University of Birmingham
2020	Energy Storage ECR Award	EPSRC Supergen

2019	Researcher of the awarded project (Outstanding Achievement, Energy, Research Project)	ICChemE
2019	Lead researcher of Outstanding Product	CHINA HI-TECH Fair 2019
2019	Nominated for the Student Award	European Association for Storage of Energy
2015	PhD scholarship (£95K)	University of Birmingham
2008	Outstanding graduate of the province, best awarded thesis	Liaoning Province, China
2009	MSc scholarship (£4,950)	Dalian University of Technology

Professional Membership and Service

Year	Membership and Service
2022-	Editorial Board Member of Applied Energy (IF=11.45)
2019-	Associate Member of the Institution of Chemical Engineer (<i>ICChemE</i>)
2025-	Associate Member of IOM
2021-	Fellow of the Higher Education Academy
2021-	Member of Royal Society of Chemistry
2021-	Member of UKRI ECR Forum
2020-	ECR committee member of the EPSRC Supergen Energy Storage Network+
2020-	Member of EPSRC Peer Review College
2020-2026	Associate Member of the Institution of Chemical Engineer (<i>ICChemE</i>)
2020	Organizing committee member of the 2nd World Energy Storage Conference
2016-Present	<i>Reviewer of Nano Energy, Advanced Materials, Nature Communications, Applied Surface Science, Applied Energy, Energy Conversion and Management, Energy Storage and Science, et al.</i>

Supervising and teaching experiences

DPHil Students: 2022(3) --Zi Huang, Nikhil Rajput, Gayatri Sundar Rajan (Claredon Scholar, Secondary).

2023(5) --Dorcas Tuitoek (Rhodes scholar, Secondary), Haoliang Hong, Zirui Wang, Hangzuo Guo and Mingchen Gao (Secondary).

2024(1) -- Zhenyu Zhou

2025(2) -- Ragad Aldilajan (Industry scholarship), Ghassan Salem AlShehry (Industry Scholarship), Yidong Zhong (Secondary, MRes).

2026(4) -- Alice Hall (MIT Rhodes Scholar), Alaa Albasry (Industry scholarship), Alhammadi, Yousif (Industry scholarship), Chaoran Yan (MRes)

PDRAs (4): Xusheng Wang, Xuesong Lu (with Prof Aidong Yang), Alexander Harrison (Move to IC in 12/25) and Le Ma (Move to Oscar, 11/24), Anthony Ball (now COO of Thermofuture Ltd.)

Undergraduate and Visiting Students: Alfred Drew (4YP), Sijia (Lucy) Wang (4YP), Charlotte Wittram (Summer Internship), James Wang (4YP), Amir Dastgheibifard (TUM).

Research Assistant: Simge Bahcevanici (2023), Zi Huang (2022), Guokun Liu (2023).

Teaching:

Chemical Engineering B7 Separation process (8 Lectures).

C11 Advanced Distillation (8 Lectures + 2 Classes/Tutorials).

Chemical Engineering Labs: B7 Separation Process, B11 Chemical Process Engineering.

3rd Year Project: Chemical Engineering, Cultured Meat.

Mini Lectures *2 (Renewable heating and cooling, Industrial Decarbonization using Green Chemicals), and Aspen Plus labs for Chemical Engineering Course Modules

Working group lead for new teaching equipment (£50k from department)

Coordinator for teaching lab move to Begbroke Science Park

Examiner/reviewer/reader for 3YP, 4YP, MRes and DPhil projects.

Leadership and Management

Dates		Organization	Position	Duties
01/2020	Present	EPSRC Supergen Energy Storage ECR Committee	Membership lead	To help the Supergen ECR community thrive and develop.
08/2020	02/2022	Birmingham Centre for Energy Storage	Cooling Sub-Group Lead	Assist the Centre Director in managing the cold storage.

Selected Workshops and Conference

[1] The 19th International Green Energy Conference & the 7th International Conference on Energy and AI. 7-10 July 2027, Oxford, Selected **Chair**.

[2] The 1st Oxford Workshop for Green Chemical Engineering, 20-21 April 2023, Oxford, **Chair**, with 53 attendees from 27 Universities and Companies.

[2] Thermal and grid-scale energy storage using offshore renewables, 12 August 2022, Oxford, **Chair**, with 20 attendees from EPSRC Supergen hubs.

[3] The clean and affordable cold chain workshop, 16-18 June 2021, Birmingham, **Chair**.

[4] Climate Exp0 – The COP26 Universities network conference, 17-21 May 2021, UK*;

[5] 10th World Congress on Chemical Engineering, 1-5 October 2017, Barcelona, Spain*;

*= Invited speaker.

Selected Publications

>100 Journal Publications; Citations~3000, h-index=29([Scholar](#))

Book Chapters:

[1] Thermal Energy Storage: Materials, Devices, Systems and Applications, [Royal Society of Chemistry](#), 2021, Chapter lead: Adsorption based thermochemical energy storage materials;

[2] Energy Storage Technologies & Applications, China Chemical Society Press (ISBN 978-7-122-12496-8), June 2018, Chapter lead: Thermal energy storage applications.

Journal papers:

Rajput, N.S., Zhang, Y., **Nie, B***. et al. (2026). Legacy wells supporting net zero by screening carbon storage and geothermal potential in the United States. *Nature Communications Earth & Environment*.

Ma, H., Zou, B., Chen, J., Jiang, Z., **Nie, B.**, & Ding, Y. (2026). Low-cost $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ -based composite thermochemical material for low-to-medium temperature heat storage. *Solar Energy Materials and Solar Cells*, 295, 113983.

Chen, X., Chen, S., Gao, M., Zhang, Y., **Nie, B.**, Fang, M., & Jiang, L. (2026). Absorption column internals, multi-scale design and industrial scale-up for post-combustion carbon capture. *Chemical Engineering Journal*, 176404.

- Harrison, A. R. P., Fulham, G. J., Hong, H., & **Nie, B***. (2026). Thermally coupled solid hydrogen storage and carbon capture for balancing intermittent renewable energy. *Nature Communications*.
- Liang, T., Li, Y., **Nie, B.**, Ahmad, A., & Ding, Y. (2025). Achieving a net-zero-carbon energy system in the UK by 2050 with liquid air energy storage. *Energy Conversion and Management*, 327, 119524.
- Zhang, X., Du, Z., He, D., Chen, Z., Li, Z., Chen, G., **Nie, B.** et al. (2025). Supercooled Liquids in a Core–Shell Coordination Structure for Practical Long-Term Energy Storage. *Advanced Materials*, 37(9), 2412528.
- Wang, Z., Ma, C., Harrison, A., Alsouleman, K., Gao, M., Huang, Z., Chen, Q., & **Nie, B***. (2025). Enhancement Strategies of Calcium Looping Technology and CaO-Based Sorbents for Carbon Capture. *Small*, 21(13), 2412463.
- Rajan, G. S., Keleş, S. Z., Peters, C. D., **Nie, B***, Bensalah, H., & Hankins, N. P. (2025). A review of co-generative and synergistic desalination and refrigeration systems for sustainable development applications. *Energy Conversion and Management*, 332, 119717.
- Hong, H., Harrison, A. R. P., & **Nie, B***. (2025). Linking the Microstructure of Ball-Milled Mg–Ni Hydrogen Storage Materials to Reactive Properties and Techno-Economic Feasibility. *Energy & Fuels*, 39(28), 13789–13800.
- Li, Z., Li, Y., Huang, K., Hu, S., Li, Y., Hong, H., Wang, X., Lin, X., Sun, F., **Nie, B.**, et al. (2025). Balancing Nucleation and Growth Kinetics Enables Fully-Coordinated Acetic Acid-Tethered Metal–Organic Frameworks for Technoeconomic-Viable Hydrogen Storage. *Advanced Energy Materials*, e03259.
- Yang, H., Wang, C., Zhang, Y., **Nie, B.**, Tong, L., Yin, S., Wang, L., & Ding, Y. (2024). Experimental investigation of a thermochemical energy storage system based on MgSO₄–silica gel for building heating: adsorption/desorption performance testing and system optimization. *Energy Conversion and Management*, 301, 118000.
- Wang, Z., Huang, Z., Huang, Y., Wittram, C., Zhuang, Y., Wang, S., & **Nie, B***. (2024). Synergy of carbon capture, waste heat recovery and hydrogen production for industrial decarbonisation. *Energy Conversion and Management*, 312, 118568.
- Faizan, M., Alkaabi, A. K., **Nie, B.**, & Afgan, I. (2024). Thermal energy storage integration with nuclear power: A critical review. *Journal of Energy Storage*, 96, 112577.
- Zhang, T., She, X., **Nie, B.**, Kildahl, H., & Ding, Y. (2024). Integration of liquid air energy storage with ammonia synthesis process for resource efficiency and cost-effectiveness. *Journal of Energy Storage*, 97, 112637.
- Wang, X., Shao, L., Hu, S., Li, Z., Guo, H., Zhang, J., Zhao, Y., Lin, X., **Nie, B***, Hu, Z., et al. (2024). A techno-economic study of photovoltaic-solid oxide electrolysis cell coupled magnesium hydride-based hydrogen storage and transportation toward large-scale applications of green hydrogen. *Energy & Environmental Science*, 17(22), 8429–8456.
- Guo, H., Harrison, A. R. P., Gao, M., Zhang, X., Chen, Q., Cui, Z., & **Nie, B***. (2024). Chemical looping based low-pressure ammonia synthesis. *Chemical Engineering Journal*, 500, 157321.
- Kheshti, M., Zhao, X., Liang, T., **Nie, B.**, Ding, Y., & Greaves, D. (2022). Liquid air energy storage for ancillary services in an integrated hybrid renewable system. *Renewable Energy*, 199, 298–307.
- Nie, B.**, Palacios, A., Zou, B., Liu, J., Zhang, T., & Li, Y. (2021). Review on phase change materials for cold thermal energy storage applications. *Renewable and Sustainable Energy Reviews*, 139.

Nie, B., Chen, J., Du, Z., Li, Y., Zhang, T., Cong, L., Zou, B., & Ding, Y. (2021). Thermal performance enhancement of a phase change material (PCM) based portable box for cold chain applications. *Journal of Energy Storage*, 40, 102707.

Nie, B., Du, Z., Chen, J., Zou, B., & Ding, Y. (2021). Performance enhancement of cold energy storage using phase change materials with fumed silica for air-conditioning applications. *International Journal of Energy Research*, 45(11), 16565–16575.

Nie, B., She, X., Zou, B., Li, Y., Li, Y., & Ding, Y. (2020). Discharging performance enhancement of a phase change material based thermal energy storage device for transport air-conditioning applications. *Applied Thermal Engineering*, 165, 114582.

Nie, B., Zou, B., She, X., Zhang, T., Li, Y., & Ding, Y. (2020). Development of a heat transfer coefficient-based design method of a thermal energy storage device for transport air-conditioning applications. *Energy*, 196, 117083.

Nie, B., Du, Z., Zou, B., Li, Y., & Ding, Y. (2020). Performance enhancement of a phase-change-material based thermal energy storage device for air-conditioning applications. *Energy and Buildings*, 214, 109895.

Nie, B., She, X., Du, Z., Xie, C., Li, Y., He, Z., & Ding, Y. (2019). System performance and economic assessment of a thermal energy storage based air-conditioning unit for transport applications. *Applied Energy*, 251, 113254.

Nie, B., She, X., Yu, Q., Zou, B., Zhao, Y., Li, Y., & Ding, Y. (2019). Experimental study of charging a compact PCM energy storage device for transport application with dynamic exergy analysis. *Energy Conversion and Management*, 196, 536–544.

Selected Patents

[1] Phase Change Materials for Heating and Cooling, GB Filed on 15/07/2023.

[2] Vehicle charging, [PCT/GB2019/050483](#), 2019.

[3] Energy Storage Device, [WO2020001510](#), 2020.