Haihui Joy Jiang, *Ph.D.*

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Employment

Continuing faculty position (Chief Investigator), School of Chemistry, **The University of Sydney** *Australia*
Sydney Horizon Fellowship; Lead a group to tackle energy, sustainability, and climate challenges 2024 Jul - current

- Selected (top 3%) among 1462 candidates across 66 countries, and awarded **$500k** as lead CI (by *USYD DVC-R*)
- Awarded with two highly selective *ARC Discovery Project Grants* (as co-CI): *DP25* (**$827k**) to develop environmentally friendly lubricants and *DP26* (**$834k**) to use catalytic air-gap electrochemistry for nitrogen fixation.
- Awarded with the CAPEX equipment grant (2025; **$124k**; as lead-CI), by *USYD DVC-R*
- Successfully raised philanthropy funding (2026; **$120k**, as sole lead-CI)
- Awarded with the Sydney Nano Kickstarter research grant (2025; **$30k**; as lead-CI), by *Sydney Nano Institute*
- *2025 Selby Research Award* (**$24k**) for chemical research excellence, by *Selby Scientific Foundation*
- *2025 ACIS-ECR Lectureship* award by the *Australasian Colloid and Interface Society*
- *2025 Asian-Australian Leadership Award* (AALA), 40 Under 40, Winner in Science (top <1%)
- Recruited, built, trained, and lead a research team of 10, achieved within 15 months of founding the group.

Research topics (in collaboration with *Harvard CCB/CFA/SEAS/EPS, UT Austin, and Washington State U*)

- Plasma (air gap) electrochemistry for nitrogen- and carbon- activation
- Experimental climate science, radical chemistry, and atmospheric chemistry
- Passive harnessing of electrostatic energy to drive chemical reactions (e.g., water sterilization, improving seed properties, electrochemical detection, and electrostatic fuel cells)
- Magneto-electrochemistry; Lorentz effects on chemical separations, chlor-alkali reactions, battery performance; ionic motors; long-range ionic transmission and control
- Zero-carbon polymers (e.g., polyphosphate and its derivatives) for thermal, electrical, and acoustic insulation

Postdoctoral Fellowship, Harvard University *Cambridge, USA*
Prof. George M. Whitesides' Group, Department of Chemistry and Chemical Biology 2019 – 2024 May
Prof. Dimitar D. Sasselov's Group, Harvard-Smithsonian Center for Astrophysics 2023 – 2024 May

- Lead/co-lead 6+ projects in Chemistry, Energy, Materials, and Engineering (6 teams, 5-10 members each)
- Led efforts on 10 reports and 6 presentations to federal funding agencies and private foundation
- Wrote a successful 3-year research grant (**$1M**, *Simons Foundation*) on solving the chemical origin of life on Earth

Education

The University of Sydney *Sydney, Australia*
Ph.D., in Chemistry (with a Materials Science focus); Scholarship Recipient (top 5%) awarded in Apr 2019
Prof. Gregory G. Warr's Group; Department of Chemistry and Sydney Nano Institute

Thesis: Structural Design of Ionic Liquids for Process Optimization

- Awarded the best research presentation in university (ranked in top 3%) and at international conferences (ranked in top 1% among eligible candidates)
- Conducted projects in soft robotics and diagnostics; Led to 2 publications (Whitesides Lab, *Harvard*) *USA*, 2018
- Research visit; Green Chemistry and Process Engineering (Welton Lab, *Imperial College London*) *UK,* 2016
- Research visit; Nanotechnology and Polymer Science (Gradzielski Lab, *TU Berlin*) *Germany,*2016
- Key contributor to the group's ARC DP Grant (**$400k**) on developing functional materials from nanostructured fluids

Harvard University *Cambridge, USA*
Master's Degree (part-time)*, Finance* (GPA 3.94/4.00) 2018 – 2020

- Certificates: Corporate Finance (2019), Strategic Management (2019), Accounting (2020)
- Dean's list of academic excellence (2020)

CORe: Credential of Readiness, Harvard Business School (Honors) 2017

- Concentrated on Business Analytics, Economics for Managers and Financial Accounting

The University of Sydney *Sydney, Australia*
Honours, Chemistry, First Class (top 5%) 2014 - 2015

- Australian Institute of Nuclear Science and Engineering Scholarship

BSc, Chemistry and Mathematics (double majors), Advanced stream (top 5%) 2012 – 2014

- Received competitive scholarships and conducted research in parallel to an accelerated degree in 2.5 years

Research at International Facilities

Rutherford Appleton Laboratory, Science & Technology Facilities Council *Oxford, UK*
Project Lead (first author), as part of my PhD research 2015 - 2018
- Wrote 3 successful proposals; Received competitive grants and beamtime at international nuclear facilities
- Managed 4 projects (led a team of 4-6 ppl for each); designed projects and sourced materials under budget
- Led data analysis with advanced simulation techniques; contributed to software development

Australian Nuclear Science and Technology Organization *Sydney, Australia*
Project Lead (first author), as part of my Honours research 2015
- Conducted highly intense projects running onsite of the nuclear facility over 72 hours with short intervals
- Coordinated project teams (4-5 ppl each) comprising instrument scientists and academic researchers

Research Presentations

Conference Talks:

2nd Australian Conference on Green & Sustainable Chemistry & Engineering Melbourne, Australia
A "Lightning" platform for Green Synthesis 2024 Dec

24th Australasian Electrochemistry Symposium, Royal Australian Chemical Institute Melbourne, Australia
Mimicking Lightning-induced Electrochemistry 2024 Dec

5th Energy Future Conference, **Future Energy Australia** Sydney, Australia
Keynote: Plasma, Magnetism, and Polyphosphates 2024 Nov

Simons Collaboration on the Origins of Life (SCOL), Simons Foundation *USA*
Carbon and Nitrogen Fixation Induced by Electrical Discharge 2020 & 2021 Nov

Neutron Scattering Symposium, Australian Institute of Nuclear Science and Engineering *Sydney, Australia*
Invited Speaker: *Structural Design of Ionic Liquids for Biomass Processing* 2018 Nov

255th American Chemical Society National Meeting *New Orleans, USA*
Choline-Amino Acid Based Ionic Liquids – From Solvent Structure to Lignin Dissolution 2018 Mar

30th Conference of the European Colloid and Interface Society *Rome, Italy*
Ionic Liquids Induce Surfactant-free Self-assembly 2016 Sep
- *Enzo Ferroni* Award; winner for the best talk (selected from 50+ candidates with 750+ conference participants)

7th Australian Symposium on Ionic Liquids *Newcastle, Australia*
A Structural Study of Protic Ionic Liquids in Biomass Dissolution 2016 May

4th Asia-Pacific Conference on Ionic Liquids and Green Processes *Sydney, Australia*
Alcohol in Protic Ionic Liquids: Dissolution or Self-Assembly 2014 Sep

Invited Seminars:

Australian Centre for Astrobiology, **University of New South Wales** *Sydney, Australia*
Radical Electrochemistry and its Relevance to the Chemical Origin of Life 2025 Aug

Department of Chemistry, **Monash University** *Melbourne, Australia*
Plasma, Magnetism, and Polyphosphates 2024 Dec

Ralph O'Connor Sustainable Energy Institute, **Johns Hopkins University** *Baltimore, USA*
Plasmas, magneto-electrochemistry, and polymers: solutions to energy challenges, inspired by nature 2023 Feb

Other externally funded invited talks *Australia*
- Centre for Materials Science, **Queensland University of Technology** 2025 Oct
- School of Chemistry, Chemical Engineering, and the Australian Institute for Bioengineering and Nanotechnology (AIBN), **University of Queensland** 2025 Oct
- School of Chemistry, **University of New South Wales** 2025 Oct
- School of Molecular Sciences, Physics, and Chemical Engineering **University of Western Australia** 2025 Nov
- School of Molecular and Life Sciences, **Curtin University** 2025 Nov
- Centre for Sustainable Bioproducts; School of Life and Environmental Science, **Deakin University** 2025 Dec

Selected Publications

As an ECR, I have an average citation of **>70 per publication** (Google Scholar), over **46%** of my articles are in journals with **IF >10**. These include ***Science Robotics*** (IF=27.5), ***PNAS*** (IF=12.8), ***JACS*** (IF=16.4) and ***Green Chemistry*** (IF=11.0). My research has received **media coverage from 35+ news outlets**, including *Harvard Gazette, Inverse Magazine, The Washington Post,* and *Science Daily*.

Top 5 publications (Chemistry and Materials Science):

Jiang, H. J.;[#] Underwood, T. C.;[#] Bell, J. G.; Anderson, J. G.; Sasselov, D. D.; Whitesides, G. M. *et al.*; (2024) "Mimicking Lightning-induced Electrochemistry on the Early Earth." *PNAS* 121, e2400819121.

- (IF = 12.8) Established key concepts in using plasma to activate and convert inert molecules into higher value products, directly relevant to the nominated research.

Jiang, H. J.; Imberti, S.; Simmons, B. A.; Atkin, R.; Warr, G. G., (2019). "Structural Design of Ionic Liquids for Optimizing Aromatic Dissolution." *ChemSusChem* 12(1): 270-274.

- (IF = 9.1) Formulated a matrix for the design of ionic solvents for targeted applications. Supporting ionic material design in the nominated research.

Jiang, H. J.; Atkin, R.; Warr, G. G., (2018). "Nanostructured ionic liquids and their solutions: Recent advances and emerging challenges." *Current Opinion in Green and Sustainable Chemistry* 12: 27-32.

- Cited 63 times; Served as a design guideline for formulating nanostructured electrolytes; supporting solvent design of the nominated research.

Jiang, H. J.; Miao, S.; Imberti, S.; Simmons, B.; Atkin, R.; Warr, G. G., (2021) "Liquid nanostructure of choline lysinate with water and a model lignin residue." *Green Chemistry,* 23 (2), 856.

- (IF=11.0) Provided structural insights and strategies for turning waste into valuable products; supporting material design in the nominated research.

Jiang, H. J.; FitzGerald, P. A.; Dolan, A.; Atkin, R.; Warr, G. G., (2014). "Amphiphilic self-assembly of alkanols in protic ionic liquids." *J. Phys. Chem. B* 118(33): 9983-9990.

- Cited 87 times; Led to a new field of research of ionic-molecular hybrid systems. Supporting electrolyte design in the nominated research.

Other relevant publications (Device Engineering and Energy-related Research):

Preston, D. J.; Jiang, H. J.; Sanchez, V.; Rothemund, P.; Rawson, J.; Nemitz, M. P.; Lee, W.-K.; Suo, Z.; Walsh, C. J.; Whitesides, G. M. (2019) "A soft ring oscillator." *Science Robotics*, 4 (31), eaaw5496.

- (IF=27.5) Cited 194 times; Designed and implemented robotic control systems with 3 demonstrations; supporting engineering of the nominated research.

Decker, C.; Jiang, H. J.; Nemitz, M. P.; Root, S. E.; Anoop Rajappan, Tracz, J.; Wille, L.; Preston, D. J.; and Whitesides, G. M.; (2022) "Programmable soft valves for digital and analog control" *PNAS*, 119 (40), e2205922119.

- (IF=12.8) Mentored the first author; Enabled programmable robots with intuitive user interfaces; supporting engineering of the nominated research.

Preston, D. J.; Rothemund, P.; Jiang, H. J.; Nemitz, M. P.; Rawson, J.; Suo, Z.; Whitesides, G. M. (2019) "Digital logic for soft devices." *PNAS*, 201820672.

- (IF=12.8) Cited 246 times; Designed and built logic components and human-operated devices; supporting engineering of the nominated research.

Alfaraidi, A. M.; Kudisch, B.; Ni, N.; Thomas, J.; George, T. Y.; Rajabimoghadam, K.; Jiang, H. J.; Nocera, D. G.; Aziz, M. J.; and Liu, R. Y. (2023) "Reversible CO2 Capture and On-Demand Release by an Acidity-Matched Organic Photoswitch" *JACS*, 145, 26720

- (IF=16.4) Trained the first author; Proof-of-concept for solar-powered gas capture; supporting the design of green electrocatalysis in the nominated research.

Shahzad A.; Jiang, H. J.; and K-F. Aguey-Zinsou. (2025) "Unitized regenerative fuel cells: fundamental challenges and advancements" *Renew. Sustain. Energy Rev.*, 215, 115631.

- (IF=31.2) Reviewed fully integrated energy systems that operate as both an electrolyser and a fuel cell; supporting the design of green and scalable electrochemical systems in the nominated research.

More on Google Scholar: https://scholar.google.com/citations?user=MUDOt2oAAAAJ&hl=en

Research Translation and Commercialization

I co-invented **12 patents** (5 granted, 7 pending), with successful implementation and **commercialization of 5 products** that are routinely purchased/used, creating **AUD 0.75M market value** to date.

Recent patent filings in Physical Sciences:

- 2024 - Coupling Optical and Potentiometric Measurements with Magnetic Levitation, PCT/US24/20475
- 2024 - A High Throughput Ion-Sensing Method, PCT/US24/20474
- 2024 - Carbon Nitrogen Activation Using Plasma (Air gap) Electrochemistry, PCT/US24/17763
- 2023 - Methods and Systems For Generating Liquid Motion, PCT/US23/35411
- 2023 - Programmable Soft Actuators for Digital and Analog Control, PCT/US23/74287
- 2023 - Harvesting Electrostatics to Perform Chemical Reactions, PCT/US23/77332
- 2022 - Polyphosphate Foams, PCT/US22/76956; and Polyphosphate Materials US20240391775

Other granted patents in Mechanical Engineering:

- 2022 – Shaft Sleeve of Rail Vehicle Breaking System, CN 216332058 U
- 2018 – A Kind of High Security Brake Device of Railway Car, CN 206954242 U
- 2017 – A Kind of Plain Type Railcar Bidirectional Brake Device, CN 206307044 U
- 2017 – A Kind of Rail Traffic Vehicles Emergency Brake Arrangement, CN 206307047 U
- 2017 – A Kind of Novel Track Car Break Gear, CN 206307046 U

Research Translation Achievements:

- In parallel to my academic career (2019-2023; COI managed), I have been a **founder and CEO.**
- developed technical and market insights into robotics, data storage, next-gen computing, and space materials
- **worked with 10+ startups and organizations** across aerospace, advanced materials, advanced manufacturing, e-commerce, technology, consumer products, and public sectors.
- worked directly with general and managing partners of venture capital firms
- identified tech opportunities across recycling, fire protection, insulating materials, and energy storage industries
- assessed market landscapes, identified relevant IP and emerging technologies, and led customer discovery calls
- led 3 marketing campaigns via digital platforms and at B2B trade shows
- secured clients in rail, automotive, aerospace, and medical device industries
- developed *a process management system* and *a certified chemical treatment technology*
- increased international sales by 40% and created new businesses in Japan, Australia, and the US

Teaching and Research Mentoring

With experience leading 6 project teams (with 5-10 members each) across three departments, I have directly advised 18 research students (across undergraduate and postgraduate levels); some are co-authors in top journals (e,g., *JACS*, *PNAS*, and *Science Robotics*). Among my research students, over 40% received competitive awards, and over 40% have been accepted into world's top 20 universities (e.g., *Harvard*, *Stanford*, *Cornell*, *Oxford* and *Cambridge*).

Lecturer and *Unit Coordinator,* **The University of Sydney** *Sydney, Australia*
Taught lectures, designed course syllabus and lecture materials, created a new module and introduced climate science to the department, assessed student performance, introduced students to scientific research, and helped students to successfully secure scholarships to conduct research both within the department and across faculties. 2024 Jul - current

- SCDL 1991 Science Dalyell Showcase (group project: plasma technologies for climate science; unit coordination 2026)
- SCDL 3991/3992 Science Dalyell Research (individual project; lightning and the chemical origin of life)
- PHYS 3888 Physics Interdisciplinary Research (group project; mimicking radical reactions in space)
- CHEM2 Intermediate Chemistry; Sustainable Chemical Manufacture
- CHEM3 Senior Chemistry, advanced seminar series on Climate Science; rated 4.6/5.0 by students

Teaching Fellow (0.25 FTE; in parallel to my postdoc job), **Harvard University** *Cambridge, USA*
Taught sections, coordinated course logistics, hosted office hours, designed course materials (e.g., section teaching materials and discussions, weekly assignments, and exams), given revision lectures, assessed student performance, marked assignments and exams, worked in teams of 4-6 teaching staff per unit. 2023 Mar - Dec

- CHEM 161 Statistical Thermodynamics (worked with Prof. Xiaowei Zhuang)
- GenEd 1167 Climate Crossroads (worked with Prof. James G. Anderson and Prof. James Engell)

Research Supervision, Prof. George M. Whitesides Group, **Harvard University** 2019 - 2024

- Recruited and supervised 11 research students across 6 research areas, including plasma-electrochemistry, magneto-electrochemistry, zero-carbon polymers, soft robotics, molecular informatics, and biomaterials

Teaching Fellow (0.2 FTE; in parallel to my PhD degree), **The University of Sydney** *Sydney, Australia*
Selected to teach tutorials in Chemistry at fundamental, standard, and advanced levels (80 sessions over a year, ~30 students per session); assessed student performance, marked weekly quiz, mid-term and final exams. 2017 Mar - Dec

Leadership and Governance

National Committee for Chemistry, Australian Academy of Science 2026 - current
Appointed to provide strategic advice, support national engagement, and foster international collaboration

United Nation, Environment Programme 2024 - 2025
International reviewing panellist (selected based on expertise), Global Environment Outlook 7 (GEO-7)

10th International Congress on Ionic Liquids (COIL-10) *Perth, Australia*
Organizing committee; developed the conference program and led digital marketing 2024 - 2025

The University of Sydney *Sydney, Australia*
Elected Academic Board Member (representing the School of Chemistry) 2026 - 2028
Chemistry Research Committee, expanding collaboration lead (Tiger team) 2025 - 2026
Chemistry Leadership Committee, leading the external partnership program 2025 Jan - Dec
Panellist at the *Chemical Engineering and Chemistry Society* event 2024 Oct

- Discussed "Actionability of Net Zero Goals: from Current Technologies and Research to Policy Making".

Panellist at the *Sydney University Chemistry Society* Symposium 2024 Sep

- Invited as a panel member, discussed career paths for chemistry HDR students

Judge at the *Science HDR Conference* 2024 Sep

- Invited as an academic judge as part of the *scientific impact* and *social impact* sessions

Panellist at the *Dalyell Networking Event,* DVC-R 2024 Aug

- Invited as a panel member and representative of the Net Zero Institute

Featured in *STEMM Career Pathway* video series, Researcher Development Hub 2025 May

- Invited by DVC-R to share my career journey, with video production to be featured on USYD website

Speaker at the *Powering Progress* event*: Accelerating Energy Storage and Innovation in NSW* 2025 Sep

- Invited as an expert panellist by the *Energy Lab*, *Sydney Knowledge Hub*, and the *Net Zero Institute* (USYD)

Panellist at the *STEM Career Fair – Science Faculty Head of School Panel Discussion* 2025 Sep

- Nominated by the Head of School, represented the School of Chemistry and spoke at this university-wide event

Professional Associations

67th Lindau Nobel Laureate Meeting *Lindau, Germany*
Fellowship awardee (top 0.1%), *Australian Academy of Science, Science and Industry Endowment* 2017

- Networked with 30 Nobel laureates, 40 *Forture500* executives and industry leaders
- Represented *the Australian Science Channel* as a field reporter and published 2 articles
- Selected to pitch at the start-up competition sponsored by *the Bayer Foundations*
- Discussion facilitator at the *BASF Circular Economy* event with 4 laureates and 50 early-career scientists
- Visiting researcher at *HIU Helmholtz Institute* for electrochemical energy storage (Ulm), *Max Planck Institute* (Stuttgart), and *Hydrogenious Technologies* for batteries (Erlangen).
- Selected to attend the *NASA Goddard Space Flight Center* alumni event (2019)
- Australian national finalist at the *Falling Walls Lab*, an international startup competition (2019)

19th Ignite Program, Cambridge Judge Business School *Cambridge, UK*
Entrepreneur 2017

- Networked with over 60 start-up founders in high-tech and biopharma sectors
- Co-founded a clean tech startup company and pitched for venture capital funding

IC Global, CSIRO – Government Agent *Australia / USA*
International Ambassador 2019

- Organization's first international ambassador to promote the collaboration between academia and industry
- Representative at the *Forbes 30Under30* Summit 2019 (as a nominee in North America, 2020) *Detroit, USA*

Management Consulting *Sydney, Australia*

- *McKinsey*, Young Professionals Network Australia; Women in Leadership Forum 2018-2019