Thomas MacDonald

Employment

December 2022–   **Senior Consultant, Energy Markets**, *Aurecon*, Sydney, Australia
Consultant working on energy markets and commercial aspects of the energy transition. My work involves providing clear advice on topics including future electricity demand and supply, market price forecasting in the NEM, revenue opportunities for energy storage systems, and advising on commercial routes to market for new renewable generation capacity.
- Implement and developed a dispatch-level market model of the NEM (Prophet 2023). This model combined a base of AEMO's ISP with with improvements to business contracting, hydro storage, climate transitions, and battery scheduling logic.
- Developed new methods to simulate revenue opportunities grid-scale batteries.
- Authored and contributed towards reports on commercial aspects of energy developments including revenue opportunities and risks and commercial routes to market.
- Promoted from Level 6 to Level 7 in July 2023, in recognition of rapid and self-directed development of energy market subject matter expertise.

2020–2022   **Postdoctoral Research Fellow**, *UNSW (School of Physics)*, Sydney, Australia
Postdoctoral research on exciton spin physics and logic operations, relevant to next-generation solar panels and some forms of quantum computing. This work combined experimental measurements, mathematical modelling (analytical model-building and numerical implementations in Python), and theoretical analysis of logic and computing with excitons.
- Independently managed a research theme within the larger group.
- Experimental studies (spin resonance) of excitonic materials.
- Built analytical models of excitonic processes using mathematical skills (calculus, linear algebra).
- Programmed processing routines (Python, Matlab) for data analysis and model fitting.
- High performance computing on local and national computing clusters (NCI Gadi, UNSW Katana).
- Wrote research papers for publication (MS Word, LaTeX).
- Communicated technical concepts with effective data visualisation and high-quality graphics.

2015–2018   **Technical assistant**, *NMR Facility, Mark Wainright Analytical Centre, UNSW Sydney*
Wrote training material and documents supporting an application for national standards accreditation.

Education

2016–2020   **PhD in Chemistry**, *UNSW*, Sydney, Australia
Research on directing the movement of molecules in solution. These included control of molecules with light, molecular logic, emergence of complex systems from simple interactions. Thesis available.
- Granted **UNSW Dean's Award for an Outstanding PhD Thesis**, awarded to candidates that "*...produce a thesis that requires only minimal corrections, receives outstanding and/or excellent levels of achievement for all examination criteria, and [...] is in the top 10% of PhD theses*".
- Research funded through award of competitive **RTP Scholarship**.
- Developed new experimental techniques and data analyses in physical chemistry.
- Built mathematical models for chemical interactions, programmed numerical simulations (Python), and used experimental data to fit and understand intermolecular processes.
- Managed own projects independently while contributing to group objectives.
- Published research in high-impact journals and presented at major conferences.

2018, April - August   **Research Exchange**, *University of Groningen*, Groningen, Netherlands
Research on new molecular devices with Prof. Ben Feringa, 2016 Nobel Laureate in Chemistry.

2011–2014   **Bachelor of Science (Honours in Chemistry)**, *University of Sydney*, Sydney, Australia
First Class Honours. Other courses include Physics, Mathematics, Engineering, Linguistics.

Projects and Personal Interests

Remote sensing   Interest in open-source intelligence, remote sensing, satellite imagery. See here for a short write-up on using publicly-available satellite radar imagery to map an earthquake in Albania.

Research Publications and Presentations

Academic research papers are listed on my Google Scholar profile and can be provided on request. Selected

presentations are available at tscmacdonald.github.io/presentations/.

References

References can be provided upon request.