

# Curriculum Vitae

## Marcus Tze-Kiat Ng

### Currently

PhD in Chemistry, University of Glasgow

### Research interests

Electrocatalysis, Energy Storage Materials, Automation

### Education

2018-present **PhD University of Glasgow, United Kingdom**

2013-2018 **MSci University of Glasgow, United Kingdom**

2011-2013 **A-levels Kolej Yayasan UEM, Malaysia**

### Professional experience

2018-present University of Glasgow, United Kingdom

- Project II: “An Automated Platform for the Discovery of Energy Materials”. This is currently a work in progress and it is at the early stage of the project. The idea is to have a closed-looped experimental platform that couples with Machine Learning that explores and optimise desired properties of certain energy materials (i.e. low overpotential and high current density for electrocatalysts; multiple redox-peaks, highly reversible, large area and square shaped CV for energy storage materials such as redox-flow battery and supercapacitor).
- Project I: “A Programmable Chemical Automata”, P.I: Prof. Leroy Cronin, Team Leader: Dr. Abhishek Sharma. This is a proof-of-concept project to show the programmability of a chemical system. The chemistry involved in this project is the chemical oscillator known as Belousov-Zhabotinsky reaction; we have showed that the chemical system is capable of emulating classic Cellular Automata (CA), as well as creating novel CA that would be impractical for conventional computer to compute.
  - My work on (Project I) predominantly goes to the development of the platform and performing the experiments. Since it's a proof-of-concept paper, there is no literature regarding the design of the physical set-up. CAD software and 3D printers were used by me for rapid prototyping on the experimental arena. To understand the phenomenological behaviour of the system, fluid mechanics and other control experiments with BZ reaction were carried out.

2017-2018 University of Glasgow, United Kingdom.

- Final Year MSci Thesis: “Investigation of ultra-reduced polyoxometalate  $\text{Li}_6[\text{P}_2\text{W}_{18}\text{O}_{62}]$  in aqueous solution”, Project Supervisor: Prof. Leroy Cronin, Mentor: Dr. Jia-Jia Chen.
- During this final year project, I have done some follow-up work from Dr. Jia-Jia Chen. My work include the synthesis of the  $\text{Li}_6[\text{P}_2\text{W}_{18}\text{O}_{62}]$  cluster as energy storage material. I have investigated the effect of concentration of the compound in aqueous phase as well as experimenting on the reversibility and stability of the electrolyte in electro- and chemo- reduction regime.

2016-2017 King Abdullah University of Science and Technology (KAUST), Saudi Arabia. - Placement Year Thesis: “Oxygen Evolution at Near Neutral pH”, Project Supervisor: Prof. Kazuhiro Takanabe, Academic Supervisor: Prof. Duncan Gregory. - My P.I in the KAUST Catalysis Centre was Prof. Kazuhiro Takanabe and my mentor was Dr. Tatsuya Shinagawa. They have taught and encouraged me to pursue the field of electrocatalysis for water splitting, I owe my passion in research to them. Throughout my placement year, I investigated the effect of electrolytes in oxygen evolution reaction (OER) in near-neutral pH; curiously, a discovery was made in a new-found protocol to activate pristine nickel catalyst to a much more active catalyst for OER.

2011 Tissue Culture Lab, Kuala Pilah, Malaysia. - Under the guidance of a tissue culture scientist, I learned to prepare the Murashige-Skoog (MS) medium for the somatic embryogenesis of *Carica papaya* L. and plant shoot buds. Additionally, I rooted some shoots in vermiculite and placed them in a greenhouse to adapt to its natural environment. This experience had highlighted the importance of precision in laboratory work, where the smallest of errors may be disastrous.

## Publications

- 1) T. Shinagawa, M.T.-K. Ng, K. Takanabe, Boosting the performance of the nickel anode in the oxygen evolution reaction by simple electrochemical activation, *Angew. Chem.*, (2017), **129**, 5143-5147
- 2) T. Shinagawa, M.T.-K. Ng, K. Takanabe, Electrolyte engineering towards efficient water splitting at mild pH, *ChemSusChem*, (2017), **10**, 4155.

## Posters & Presentations

2018 RSC Twitter poster. (online) - “Autonomous self-driving laboratory for complex systems”, M.T.-K. Ng, J. Grizou, A. Sharma, L. Cronin.

2018 Energy materials for a low carbon future, Discussion Meeting. (London, UK) - “High Capacity Aqueous Molecular Metal Oxide Redox Mediators”, J.-J.Chen, M.T.-K. Ng, L. Cronin.

2018 MSci Project Presentation. (Glasgow UK)

- “Investigation of ultra-reduced polyoxometalate  $\text{Li}_6[\text{P}_2\text{W}_{18}\text{O}_{62}]$  in aqueous solution”

2017 Placement Year Project Presentation. (Glasgow, UK)

- “Oxygen Evolution at Near Neutral pH”

### Volunteering

- Chemistry tutor Being a tutor taught me to be organized and phrase complicated concepts in the simplest way, especially when it comes to conveying the idea of fundamental principal of chemistry.
- Language4Water (Water Aid) As a language teacher of 13 students, I developed good interpersonal skills as every student has different ways of understanding the language.
- International Lifesaving Federation (ILS) Bronze medallion instructor I instructed seven trainees with different levels of water confidence. In response to their individual needs, I provided extra swimming lessons and worked to establish the essential trust and reliance needed in a successful learning environment.

### Additional

- Trilingual (English, Mandarin, Malay)
- ILS Life Saver
- PADI Advanced Open Water Diver