

Alec LaGrow, Ph.D., BSc (Hons)

• +351-912 135 340 • alec.lagrow@gmail.com, alec.lagrow@inl.int

• Nationality: New Zealand and United States of America

Professional Experience

Transmission Electron Microscopist - Facility Manager **September 2018 – Present**
International Iberian Nanotechnology Laboratory (INL)

Facility manager in the Department of Department of Advanced Electron Microscopy, Imaging and Spectroscopy at INL. The position entails running the aberration corrected electron microscopes, providing hands-on training and technical support to internal and external users from academia, industry and non-profit organizations, as well as carrying out research into technique development.

Post-Doctoral Research Associate **September 2016 – September 2018**
University College London (UCL), Department of Physics and Astronomy

Worked with Professor Nguyen Thanh and Professor Asterios Gavrilidis, on advanced flow technology for healthcare material's manufacturing, focusing on magnetic nanoparticles for hyperthermia, as part of the MAFuMa research team.

Post-Doctoral Fellow **February 2015 – September 2016**
University of York, Department of Physics and the York Nanocentre

Working with Professor Ed Boyes and Professor Pratibha Gai on *in-situ* aberration corrected electron microscopy of oxidation and corrosion processes in metallic systems. The position entailed carrying out oxidation studies in TEM and STEM under gas environments at elevated temperature.

Post-Doctoral Fellow **February 2013 – February 2015**
King Abdullah University of Science and Technology (KAUST), Materials Science and Engineering

Working with Associate Professor Osman Bakr as a post-doctoral fellow in nanomaterials. The position focused on using flow chemistry to create scalable solution syntheses of nanoparticles and characterization with image and probe corrected transmission electron microscopy.

Education

Doctor of Philosophy in Chemistry, Nanomaterials
Victoria University of Wellington **2009-2012**

Thesis: *Synthesis and Characterisation of Nickel and Iron-Nickel Nanoparticles*.
Supervisors: Prof. Richard D. Tilley and Dr. Gideon Gouws

Bachelor of Science with Honours First Class in Chemistry,
Victoria University of Wellington **2008**

Thesis: *Nanostructures Formed from Decomposition Reactions with Silane Gas*.
Supervisors: Dr. Christopher Bumby and Prof. Richard Tilley

Bachelor of Science in Chemistry,
Victoria University of Wellington **2005-2007**

Teaching Experience

Electron Microscopy Training (INL) **September 2018- Present**

Training internal and external users on the operation of the JEOL 2100, the probe corrected ChemiSTEM, and the double corrected Titan Themis at the International Iberian Nanotechnology Laboratory. The techniques include conventional transmission electron microscopy, electron diffraction, scanning transmission electron microscopy, energy dispersive X-ray spectroscopy, electron energy loss spectroscopy, aberration correction (probe and image), monochromation and spectrum imaging.

Electron Microscopy Training (UCL)

September 2016- September 2018

Training internal and external users on the operation of the JEOL JEM 1200 EX in using transmission electron microscopy and electron diffraction.

Chemistry Demonstrator

March 2008 – November 2010

Victoria University at Wellington, School of Chemical and Physical Sciences

CHEM 113 (Concepts of Chemistry)	2008-2010
CHEM 114 (Principles of Chemistry)	2008
CHEM 115 (Structure and Spectroscopy)	2009-2010

Student Supervision

University College London

I supervised the following students with Prof. N.T.K. Thanh

Nur Hanisah Abu Talib

Summer Intern, 2018

Chemistry MSc, 2018-Ongoing

Chemistry MSc 2016-2017

Ervin Haxjiah,

Thesis: *Development of rod-shaped iron oxide nanoparticles*

King Abdullah University of Technology (KAUST)

I supervised the follow student with Prof. Osman Bakr, and continued his supervision till completion once I had left KAUST

Dr. Noktan M. AlYami,

Ph.D. Chemistry, 2013-2017

Thesis: *Nanoengineering of Ruthenium and Platinum-based Nanocatalysts by Continuous-Flow Chemistry for Renewable Energy Applications*

Research Outputs

Publications

- 20) **A. P. LaGrow**,* D. C. Lloyd, D. Schebarchov, P. L. Gai, E. D. Boyes. In-Situ Visualization of Site Dependent Reaction Kinetics in Shape Controlled Nanoparticles: Corners vs Edges, *Journal of Physical Chemistry C*. **2019**.
- 19) **A. P. LaGrow**, M. O. Besenhard, A. Hodzic, A. Sergides, L. K. Bogart, A. Gavriilidis, and N. T. K. Thanh. Unravelling the Growth Mechanism of the Co-Precipitation of Iron Oxide Nanoparticles with the Aid of Synchrotron X-Ray Diffraction in Solution, *Nanoscale*. **2019**.
- 18) **A. P. LaGrow**,* D. C. Lloyd, P. L. Gai, E. D. Boyes. In-Situ Scanning Transmission Electron Microscopy of Ni Nanoparticle Redispersion via the Reduction of Hollow NiO, *Chemistry of Materials*. **2018**, 30, 197-203.
- 17) N. M. AlYami, **A. P. LaGrow**, D. H. Anjum, C. Guan, X. Miao, L. Sinatra, D.-J. Yuan, O. F. Mohammed, K.-W. Huang, O. M. Bakr. Synthesis and Characterization of Branched fcc/hcp Ruthenium Nanostructures and their Catalytic Activity in Ammonia Borane Hydrolysis, *Crystal Growth and Design*. **2018**, 18, 1509-1516.
- 16) **A. P. LaGrow**,* N. M. AlYami, D. C. Lloyd, O. M. Bakr, E. D. Boyes, P. L. Gai. In-Situ Oxidation and Reduction of Triangular Nickel Nanoplates via Environmental Transmission Electron Microscopy, *Journal of Microscopy*. **2018**, 269, 161-167.
- 15) M. O. Besenhard, R. Baber, **A. P. LaGrow**, L. Mazzei, N. T. K. Thanh and A. Gavriilidis. A new Insight into the Effect of Mass Transfer on the Synthesis of Silver and Gold Nanoparticles, *CrystEngComm*, **2018**, 20, 7082-7093.

- 14) S. Famiani, **A. P. LaGrow**, M. O. Besenhard, S. Maenosono and N. T. K. Thanh. Synthesis of Fine-Tuning Highly Magnetic Fe@FexOy Nanoparticles through Continuous Injection and a Study of Magnetic Hyperthermia, *Chemistry of Materials*, **2018**, *30*, 8897–8904.
- 13) E. D. Boyes, T. E. Martin, D. C. Lloyd, **A. P. LaGrow**, RW Mitchell, L Lari, In-situ Visualization and Analysis of Single Atom Dynamics in Chemical Reactions using Novel Environmental-Scanning Transmission Electron Microscopy (ESTEM), *Microscopy and Microanalysis*, **2018**, *24*, 1506-1507.
- 12) **A. P. LaGrow**,* T. M. D. Besong, N. M. AlYami, K. Katsiev, D. H. Anjum, A. AbdElkader, P. M. F. J. Costa, V. M. Burlakov, A. Goriely, O. M. Bakr. Trapping Shape-Controlled Nanoparticle Nucleation and Growth Stages via Continuous-Flow Chemistry, *Chemical Communications*, **2017**, *53*, 2495 – 2498.
- 11) **A. P. LaGrow**,* M. R. Ward, D. C. Lloyd, P. L. Gai, E. D. Boyes. Visualizing the Cu/Cu₂O Interface Transition in Nanoparticles with Environmental Scanning Transmission Electron Microscopy, *Journal of the American Chemical Society*, **2017**, *139*, 179-185.
- 10) N. M. AlYami, **A. P. LaGrow**, K. S. Joya, J. Hwang, K. Katsiev, D. H. Anjum, Y. Losovyj, L. Sinatra, J. Y. Kim, O. M. Bakr. Tailoring Ruthenium Exposure to Enhance the Performance of *fcc* Platinum@Ruthenium Core-Shell Electrocatalysts in the Oxygen Evolution Reaction, *Physical Chemistry Chemical Physics*, **2016**, *18*, 16169-16178.
- 9) **A. P. LaGrow**, K. R. Knudsen, N. M. AlYami, D. H. Anjum, O. M. Bakr. Effect of Precursor Ligands and Oxidation State in the Synthesis of Bimetallic Nano-Alloys, *Chemistry of Materials*, **2015**, *27*, 4134-4141.
- 8) L. Sinatra, **A. P. LaGrow**, W. Peng, A. R. Kirmani, A. Amassian, H. Idriss, O.M. Bakr. A Au/Cu₂O–TiO₂ system for photo-catalytic hydrogen production. A pn-junction effect or a simple case of in situ reduction? *Journal of Catalysis*, **2015**, *322*, 109–117.
- 7) P. L. Gai, L. Lari, M. R. Ward, T. Martin, R. W. Mitchell, D. Lloyd, **A. LaGrow**, I. Wright, E. D. Boyes. Recent Progress with AC E(S)TEM and Application to Single Atom Catalysis, *Microscopy and Microanalysis*, **2015**, *21*, 731-732.
- 6) **A. P. LaGrow**, L. Sinatra, A. Elshewy, K-W. Huang, K. Katsiev, A. R. Kirmani, A. Amassian, D. H. Anjum, O. M. Bakr. Synthesis of Copper Hydroxide Branched Nanocages and their Transformation to Copper Oxide, *Journal of Physical Chemistry C*, **2014**, *118*, 19374–19379.
- 5) A. O. El-Ballouli, E. Alarousu, M. Bernardi, S. M. Aly, **A. P. LaGrow**, O. M. Bakr, and O. F. Mohammed. Quantum Confinement-Tunable Ultrafast Charge Transfer at the PbS Quantum Dot and Phenyl-C61-butyrilic Acid Methyl Ester Interface, *Journal of the American Chemical Society*, **2014**, *136*, 6952–6959.
- 4) **A. P. LaGrow**, B. Ingham, M. F. Toney, R. D. Tilley. The Effect of Surfactant Concentration and Aggregation on the Growth Kinetics of Nickel Nanoparticles. *Journal of Physical Chemistry C*, **2013**, *117*, 16709–16718.
- 3) **A. P. LaGrow**, S. Cheong, J. Watt, B. Ingham, M. F. Toney, D. A. Jefferson, R. D. Tilley. Can Polymorphism be Used to form Branched Metal Nanostructures? *Advanced Materials*, **2013**, *25*, 1552–1556.

- 2) W.R. Siah, **A. P. LaGrow**, M.J. Banholzer and R.D. Tilley. CdSe Quantum Dot Growth on Magnetic Nickel Nanoparticles, *Crystal Growth & Design*, **2013**, *13*, 2486–2492.
- 1) **A. P. LaGrow**, B. Ingham, S. Cheong, G. V. M. Williams, C. Dotzler, M. F. Toney, D. A. Jefferson, E. C. Corbos, P. T. Bishop, J. Cookson and R. D. Tilley. Synthesis, Alignment and Magnetic Properties of Monodisperse Nickel Nanocubes, *Journal of the American Chemical Society*, **2012**, *134*, 855-858.

Book Chapter

A. P. LaGrow, M. O. Besenhard, R. Hachani, N. T. K. Thanh, Experimental considerations for scalable magnetic nanoparticle synthesis and surface functionalization for clinical applications. *Clinical Applications of Magnetic Nanoparticles*. ISBN 978-1-138-05155-3. CRC Press, Taylor & Francis. **2018**.

Patent

O. M. Bakr, K. R. Knudsen, **A. P. LaGrow**, N. M. AlYami, H. Mehenni. SCALABLE SHAPE- AND SIZE-CONTROLLED SYNTHESIS OF METAL NANO-ALLOYS, **2016**, Publication number: WO2016009274 A1.

Presentations

‘In-Situ Scanning Transmission Electron Microscopy of Oxidation and Reduction Processes in Nanoparticles’, **A. P. LaGrow**. Invited talk presented at Victoria University of Wellington, New Zealand, 26 March 2018.

‘In-Situ and Ex-Situ Transmission Electron Microscopy of Nanoparticle Catalysts’, **A. P. LaGrow**. Invited talk presented at Hamad Bin Khalifa University, Qatar, 21 January 2018.

‘Continuous Flow Synthesis of Iron Oxide Nanoparticles,’ **A. P. LaGrow**, M. O. Besenhard, A. Gavriilidis, N. T. K. Thanh. Talk presented at UK Colloids 2017, Manchester, United Kingdom, 10 – 12 July 2017.

‘Continuous Flow Synthesis of Shape Controlled Platinum-Nickel Nanoparticles with Controlled Sizes,’ **A. P. LaGrow**, K. R. Knudsen, N. AlYami, D. H. Anjum, O. M. Bakr. Talk presented at the International conference for Advanced Materials and Nanotechnology (AMN-7), Nelson, New Zealand, 8 - 12 February 2015.

‘Aberration Corrected STEM of Shape Controlled 1-3 nm Nanoparticles,’ **A. P. LaGrow**, N. AlYami, O. M. Bakr. Talk presented at Microscopy NZ, Dunedin, New Zealand, 2 - 4 February 2015.

Invited: ‘Controlling Size in the Production of Platinum Alloy Nano-octahedra,’ **A. P. LaGrow**, K. R. Knudsen, N. AlYami, D. H. Anjum, O. M. Bakr. Invited talk presented at Victoria University of Wellington, New Zealand, 30 January 2015.

‘Shape Controlled Synthesis of fcc and hcp Nickel Nanoparticles by Autocatalytic Growth,’ **A. P. LaGrow**, B. Ingham and R. D. Tilley. Invited talk presented at University of Cambridge, United Kingdom, 25 July 2013.

‘Shape control synthesis of Copper Hydroxide and Oxide nanostructures,’ **A. P. LaGrow**, L. Sinatra, H. Katsiev, B. Yu, O. Bakr. Talk at University of Oxford, United Kingdom, as part of the Surfactants meeting, 22 July 2013.

‘Hexagonal Nanorods Grown from fcc Nickel Seeds,’ **A. P. LaGrow**, and R. D. Tilley. Talk presented at the national Nanocluster Meeting, Martinborough, New Zealand, 23 - 25 November 2011.

'Shape Control of Nickel Nanoparticles,' **A. P. LaGrow**, S. Cheong, B. Ingham, M. F. Toney, R. D. Tilley. Talk presented at the international conference for Advanced Materials and Nanotechnology (AMN-5), Wellington, New Zealand, 7 - 11 February 2011.

'Synthesis and Characterisation of Shape Controlled Nickel Nanoparticles,' **A. P. LaGrow**, and R. D. Tilley. Talk presented at the national Nanocluster Meeting, Picton, New Zealand, 11 - 12 October 2010.

Scholarships and Awards

2012	Victoria University Doctoral Completion Award
2012	Curtis Gordon Research Scholarship in Chemistry
2009 – 2012	Victoria University Doctoral Assistantship
2008	Honours First Class for B.Sc. (Hons) completion
2008	Victoria University Graduate Award
2008	Curtis Gordon Research Scholarship in Chemistry
2004	The Freemason University Scholarship

Professional courses

Monochromated TEM, STEM and EELS Training **10 – 14 December 2018**

Attended a four-day training course given by Dr. Daniel Stroppa from Thermo Fischer on monochromated TEM, STEM and EELS at INL.

Advanced EELS and EFTEM Training School GmbH **17 – 20 November 2015**

Attended a four-day course from Gatan in Jülich, Germany on EELS and EFTEM.

Microscopy NZ – Atomic Resolution Imaging of Materials **5 February 2015**

Attended a full day theoretical course on high resolution TEM and STEM imaging given by Prof. Joanne Etheridge at Microscopy NZ in Dunedin, New Zealand.

CCEM Summer School on Electron Microscopy **2 – 6 June 2014**

Attended a week long intensive course at the Canadian Centre for Electron Microscopy (CCEM), McMaster University in Hamilton, Canada. The course specializes in using aberration corrected Titan microscopes.

Avizo Fire visualization training course by FEI **25 – 26 May 2014**

Attended a two-day course on Avizo Fire visualization run by Gwenole Tallec, FEI applications engineer, at KAUST.

Tomography training course by FEI **2– 6 February 2014**

Attended a week-long course on tomography data acquisition and reconstruction run by Yuri Rikers, FEI applications engineer, at KAUST.

MEM commercialization course **10–14 September 2012**

Attended a week-long commercialization course as part of the Master of Engineering Management at University of Canterbury, Christchurch, New Zealand.

Professional Service

Volunteer positions

Committee member of Chiasma Wellington	2012
Committee member of MacDiarmid Emerging Scientists Association	2011 – 2012
New Zealand Institute of Chemistry Student representative	2009 - 2010

Science Outreach

3 minute thesis

2011

Victoria's Faculties of Science and Engineering Tell us a Story postgraduate competition

2011

SLAC Today article- Science Snapshot: Nickel Nanocubes

2011

Art in Nanotechnology Exhibition:

2010

Two electron microscopy images were selected for exhibition and one awarded third place in the Art in Nanotechnology Exhibition in Christchurch, New Zealand 11 August - 10 September 2010.

NZIC Chemistry Quiz Organizer

2009-2010