

Dr Lewys Jones PhD FRMS MInstP (he/him)

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Research website : www.tcd.ie/Physics/research/groups/ultramicroscopy Research Group Twitter : [@TCD_Ultramic](https://twitter.com/TCD_Ultramic)

Research Abstract

My current research is focused on the acquisition and analysis of atomic-resolution imaging and spectroscopy in the scanning transmission electron microscope (STEM). This concentrates on delivering maximum precision and reliability of materials data through detailed instrument-calibration, data-processing and quantitative-analysis. Specifically, this includes normalised annular dark-field (ADF) for nanoparticle metrology, non-rigid registration of multi-frame image data for atomic scale strain measurement, and data-processing of multi-frame spectrum imaging for improved EELS and EDX signal-noise ratios. These advanced techniques are then utilised to deliver atomic resolution nano-metrology to inform materials modelling and rational catalyst and energy-harvesting materials-design. Software arising from this research has since been commercialised via licensing and has delivered gross sales exceeding \$700,000.

More recently, I am active in exploring how new advances in 3D printing and low-cost manufacturing are enabling a new 'maker space' type innovation in microscopy hardware. We are exploring how we can use this to reduce the cost of high-performance infrastructure, to extend its service lifetime, or to reduce the environmental / carbon footprint.

Education:

- Trinity Business School, Level-8 Certificate in "Creative Thinking, Innovation & Entrepreneurship" 2021 - 2022
- Imperial College Business School & Royal Society, "Scientific Entrepreneurship" Course Feb 2020
- University of Oxford, DPhil (PhD) Student – Materials Science 2009 - 2013
- University of Oxford, Materials Science (MEng – 1st Class Honours) 2005 - 2009

Employment History:

- Founder & Director of campus start-up company "turboTEM Ltd." 2022 - present
- Royal Society & Science Foundation Ireland University Research Fellow (URF) 2019 - present
- Ussher Assistant Professor in Ultramicroscopy (tenured), School of Physics, Trinity College Dublin 2017 - present
- JEOL-JM Metrology Development Scientist, Dept. of Materials, U. Oxford & Diamond I14, Harwell 2016 - 2017
- Post-doctoral Research Associate, Department of Materials & Corpus Christi College, U. Oxford 2013 - 2016
- Postgraduate tutor & Teaching Assistant, St Catherine's & St Anne's Colleges Oxford, UK 2009 - 2013
- Visiting Masters Research Student, University of California Santa Barbara, USA Sept '08 - Apr '09
- Undergraduate Exchange Student Researcher, Tokyo Institute of Technology, Japan June - Sept 2008

Recent Grants / Awards:

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|----------------------------------|---------------------------------|----------------|------|----------|
| • Sust. Energy Authority Ireland | RD&D Grant | RDD835 | 2023 | € 67,280 |
| • Science Foundation Ireland | US-Ireland NSF Grant | SFI/21/US/3785 | 2022 | €349,602 |
| • Enterprise Ireland | Commercialisation Fund | CF 2021 1769 A | 2022 | €373,261 |
| • Science Foundation Ireland | Frontiers of the Future Project | 19/FFP/6813 | 2020 | €423,845 |
| • SFI & Royal Society | University Research Fellowship | URF/RI/191637 | 2019 | €891,194 |
| • Science Foundation Ireland | AMBER PhD Studentship | 17/RC-PhD/3477 | 2018 | €146,000 |

Highlighted Publications:

- “Electron counting detectors in scanning transmission electron microscopy via hardware signal processing”, J. Peters, T. Mullarkey, E. Hedley, K.H. Müller, A. Porter, A. Mostaed, L. Jones, *Nature Communications* (2023) [Link](#)
- “*Scanning Transmission Electron Microscopy: Advanced Characterization Methods for Materials Science Applications*”, Book (ISBN 9780367197360), edited by Alina Bruma, *CRC Press* (2021) [Link](#)
- “*Smart Align – a new tool for robust non-rigid registration of scanning microscope data*” (open access), Lewys Jones et al., *Advanced Structural and Chemical Imaging* **1:8** (2015) [Link](#)
- “*Towards data-driven next-generation transmission electron microscopy*”, Steven Spurgeon, Colin Ophus, Lewys Jones et al., *Nature Materials* **20** (2021) [Link](#)
- “*Managing dose-, damage- and data-rates in multi-frame spectrum-imaging*”, Lewys Jones et al., *Microscopy* **67** (2018) [Link](#)
- “*Predicting the oxygen binding properties of platinum nanoparticle ensembles by combining high-precision electron microscopy & DFT*”, Jolyon Aarons, Lewys Jones, Aakash Varambhia, Katherine E. MacArthur, Dogan Ozkaya, Misbah Sarwar, Chris-Kriton Skylaris, Peter D. Nellist, *Nano Letters* **17(7)** (2017) [Link](#)
- “*Rapid Estimation of Catalyst Nanoparticle Morphology and Atomic-Coordination by High-Resolution Z-Contrast Electron Microscopy*” Lewys Jones et al. *Nano Letters* **14(11)** (2014) [Link](#)
- “*Atomic scale dynamics of a solid state chemical reaction directly determined by annular dark-field electron microscopy*” T. Pennycook, L. Jones, H. Pettersson, V. Nicolosi and P. Nellist, *Nature: Scientific Reports* **4** 7555 (2014) [Link](#)

Academic Awards:

- Trinity Research & Innovation “Inventors Award” Category Winner 2023
- Institute of Physics, Business Start-up Award Winners 2023
- Microscopy Today Innovation Award, Best Product Launched 2022 2023
- Trinity Research & Innovation “Ones to Watch” Category Winner 2022
- Microscopy & Microanalysis (Cambridge Journals) Outstanding Reviewer Award 2019
- Microanalysis Society (MAS) Macres Award for Best Instrumentation Paper 2018 2019
- Oxford Instruments ‘Eric Samuel Memorial Award’ Postdoctoral Scholarship 2017
- EMS Outstanding Paper Award for 2015 – Materials Sciences Category 2016
- Winner International Federation of Societies for Microscopy (IFSM) “Young Scientist Award” 2014
- International Microscopy Congress (IMC) 2014 European Scholarship Winner 2014
- Birks Award for Best Contributed Paper at M&M2013 (second author) 2014
- Microscopy Society of America (MSA) ‘M&M2013 Best Poster – Instrumentation Category’ 2013
- Microanalysis Society (MAS) ‘M&M2012 – Distinguished Scholar Award’ 2012
- Microscopy Society of America (MSA) ‘M&M2012 Best Poster – Instrumentation Category’ 2012
- Royal Microscopical Society (RMS) ‘EMC2012 Platform Presenter Bursary Recipient’ 2012
- Institute of Physics ‘EMAG 2011 Best Student Presentation – Runner-up’ 2011
- Oxford Materials ‘Hetherington Prize for Best Postgraduate Research Presentation’ 2011

Positions Held:

- President of the Microscopy Society of Ireland (MSI) 2021 - present
- Editorial Board Member, Royal Society Publishing [Philosophical Transactions A](#) 2020 - present
- Associate Editor, Editorial Board, [Advanced Structural & Chemical Imaging](#) (Springer Nature Open) 2016 - 2020
- Centre for Research on Adaptive Nanostructures & Nanodevices (CRANN) Executive Committee 2018 - present
- Ordinary Committee Member of the Microscopy Society of Ireland (MSI) 2018 - Present
- Co-editor, [Journal of Microscopy](#) themed issue ‘Microscopy of Semiconducting Materials’ 2017

- Fellow of the Royal Microscopical Society (FRMS) 2015 - present
- Member of the Institute of Physics (IOP) 2010 – present

Conferences & Meetings:

- Symposium Organiser, EMC 2024, Copenhagen, Denmark Aug 2024
- Symposium Organiser, M&M2023, Minneapolis, USA July 2023
- Invited Speaker, “3rd Sino-European ECR Workshop on Electron Microscopy” (SEEM 2022) Dec 2022
- Symposium Organiser, M&M2022, Portland, USA July 2022
- Invited Speaker, Japanese Society for Microscopy annual meeting May 2022
- Invited Speaker, “Turkish Society for Microscopy Annual Conference” (online) Sept. 2021
- Invited Lecturer, “Advanced Electron Microscopy Summer School”, CCEM, McMaster Uni. 2015, '16, '17 '19, '20
- Organizing Committee & Session Chair, Microscopy Society of Ireland Annual Symposium Jan 2020
- Invited Speaker, “New Frontiers in EM” Meeting, Ringberg, Germany July 2019
- Invited Speaker, TEMSpec - 4th International workshop on TEM Spectroscopy, Uppsala, Sweden June 2019
- Invited Speaker, Next-generation Transmission Electron Microscopy (NexTEM), PNNL, USA Oct 2018
- Invited Speaker, 19th International Microscopy Congress (IMC19), Sydney, Australia Sept. 2018
- Invited Speaker, Microscopy & Microanalysis (M&M2018), Baltimore, USA Aug. 2018
- Invited Speaker, IoP-EMAG “Applications of EM to Beam Sensitive Materials”, U. Warwick, UK July 2018
- Invited Speaker, “Mathematical Advances in Electron Microscopy”, CMO-BIRS, Oaxaca, Mexico Oct. 2017
- Invited Speaker, Microscopy & Microanalysis (M&M2017), St. Louis, USA Aug. 2017
- Invited Speaker, MSA “New Instrumentation for Electron Microscopy” Pre-meeting Congress Aug. 2017
- Invited Speaker, MMC 2017 “EMAG Pre-congress workshop” July 2017
- Conference Co-chair “Microscopy of Semiconducting Materials” (MSM-XX), Oxford, UK Apr. 2017
- Invited Speaker, SCANDEM2016, NTNU Trondheim, Norway June 2016
- Invited Speaker, “New Frontiers in EM” Meeting, Ringberg, Germany June 2016
- Invited Speaker, “Metal nanoparticles: Manufacturing and Characterisation”, U. Bath, UK Sept. 2015
- Invited Speaker, Microscopy & Microanalysis (M&M2015), Portland, USA Aug. 2015
- Invited Speaker, European Microbeam Analysis Society Workshop (EMAS), Portorož, Slovenia May 2015
- Invited Lecturer, SuperSTEM Summer School on Aberration Corrected Electron Microscopy, UK July 2014
- Invited Speaker, IChemE Progress & Challenges in Environmental Catalysis, Reading, UK June 2014
- Invited Lecturer, NorTEM Workshop, NTNU Trondheim, Norway Jan. 2014
- Invited Speaker, “X-ray and Electron Beams for Materials Characterization”, Marburg, Germany Nov. 2013
- Invited Speaker, Microscopy & Microanalysis (M&M2013), Indianapolis, Indiana Aug. 2013

References

Professor Valeria Nicolosi,
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