Liam Collins
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Publications

Education

University College Dublin	Physics	Ph.D., 2014
University of Limerick	Physics	MSc., 2009
University of Limerick	Biological Science Education	BSc (Ed)., 2008

Professional Experience

Postdoctoral Research Associate, Oak Ridge National Laboratory	2015- present
Laboratory Teaching Assistance, UCD School of Physics & Conway Institute of Biomolecular and Biomedical Research	2010 - 2015
Class Tutor, University of Limerick	2008 - 2010
Dunmore Community School, Secondary School Teacher	2007 - 2008

Research Interests

My research is focused on characterizing electrostatic, ionic, electronic, mechanical and electrochemical phenomena at the solid–liquid interface. My goals include developing techniques capable of studying electrochemical phenomena locally on the level of a single nanopore, step edge, or structural defect and applying them to study energy materials and devices under *in-operandi* conditions. In ambient and ultra-high vacuum environments Kelvin Probe Force Microscopy (KPFM) has become one of the primary techniques for mapping surface potentials. Until now, however, implementation in conductive liquids was impossible. I am developing multidimensional approaches (e.g. electrochemical force microscopy) combined with fast detection and information theory analysis to push the limits beyond that of existing KPFM approaches.

Honors and Awards

MRS Graduate Student award (Gold), Spring MRS 2014, San Francisco. 2014

Selected Publications

- Collins, L., et al. "Quantitative 3D-KPFM imaging with simultaneous electrostatic force and force gradient detection." *Nanotechnology* 26.17 (2015): 175707.
- Collins, Liam, et al. "Probing charge screening dynamics and electrochemical processes at the solid–liquid interface with electrochemical force microscopy." *Nature communications* 5 (2014).
- Collins, Liam, et al. "Dual harmonic Kelvin probe force microscopy at the graphene–liquid interface." *Applied Physics Letters* 104.13 (2014): 133103.
- Collins, Liam, et al. "Band excitation Kelvin probe force microscopy utilizing photothermal excitation." *Applied Physics Letters* 106.10 (2015): 104102.
- Collins, Liam, et al. "Kelvin probe force microscopy in liquid using electrochemical force microscopy." *Beilstein journal of nanotechnology* 6.1 (2015): 201-214.
- Collins, Liam, et al. "Open loop Kelvin probe force microscopy with single and multi-frequency excitation." *Nanotechnology* 24.47 (2013): 475702.

Graduate and Postdoctoral Advisors

Ph.D. Advisors:	Brian Rodriguez (UCD, Dublin), Suzi Jarvis (UCD, Dublin)
Postdoctoral Advisors:	Nina Balke (ORNL)