Michael S. Inkpen

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Employment

Assistant Professor of Chemistry, Department of Chemistry, University of Southern California, USA — 2019-

Marie Skłodowska-Curie Fellow, Departments of Applied Physics and Chemistry, Columbia University, USA *and* University of Rennes 1, France — 2015-2018

Research Associate, Department of Chemistry, Imperial College London, UK — 2013-2015

Education

Imperial College London, UK — 2008-2013
Ph.D. in Organometallic Chemistry (Advisors: Nicholas J. Long, Tim Albrecht)
Thesis title: "Branched organometallic complexes for molecular electronics"

Durham University, UK — 2004-2008
M.Chem. w/ Industrial Project, 1st class Honours
Thesis title: "The controlled release of volatile organic molecules from dry paint films"

Research Experience

Marie Skłodowska-Curie Fellow, Departments of Applied Physics and Chemistry, Columbia University, USA *and* University of Rennes 1, France — 2015-2018
Advisors: Latha Venkataraman, Philippe Hapiot

scanning tunnelling microscope-based break junction (STM-BJ), single-molecule electronics, self-assembled monolayers (Au, Ag), x-ray photoelectron spectroscopy, surface chemistry (thiols, N-heterocyclic carbenes), programming/data analysis (Igor)

Research Associate, Department of Chemistry, Imperial College London, UK — 2013-2015
Advisors: Nicholas J. Long, Tim Albrecht (now at University of Birmingham)

organometallic and coordination chemistry (synthesis, catalysis), surface and solution electrochemistry, mixed valence complexes, STM (imaging, current-distance spectroscopy), programming and data analysis (MATLAB, Macro Scheduler)

Ph.D. Student, Department of Chemistry, Imperial College London, UK — 2008-2013
Advisors: Nicholas J. Long, Tim Albrecht (now at University of Birmingham)

Research Student, ICI Paints/AkzoNobel, Slough, UK — 2007-2008
Advisors: Tom Munhoven, Manish Sarkar

heterogenous polymerization, paint and supramolecular (host-guest) chemistry

Funding and Awards

ACS Postdoc to Faculty (P2F) Workshop, Washington, DC — 2017
(1 of 40 selected participants out of ~120 applicants, to help prepare for an academic career)

MRSEC Three-Minute Pitch, Columbia University, USA — 2016
(winning proposal to harness/exploit giant piezoelectricity in 2D metal monochalcogenides)

Marie Skłodowska-Curie Global Fellowship, European Research Council — 2015
(€246,668.40 awarded for 3-year research project *Molecular 'Click-tronics'*, ID: 657247)

Travel Grant, Faraday Division, Royal Society of Chemistry — 2014
(£800 awarded to attend 15th Topical Meeting of the ISE in Niagara Falls, Canada)

Imperial Postdoc Sandpit Challenge, Imperial College London, UK — 2013
(winning proposal for a bioinspired route to carbon nanomaterials from waste chemicals)

GlaxoSmithKline Book Prize, Durham University, UK — 2005

(in recognition of 1st class results on formative 1st year undergraduate exams)

Research and Teaching Interests

- Syntheses of atypical organic and organometallic materials for applications in single-molecule electronics, materials science, catalysis, and beyond.
- Fundamental charge transfer processes on the nanoscale (using scanning probe, surface/solution electrochemical techniques), with a focus on *hopping* transport.
- New design strategies in self-assembled monolayers, including the use of *in situ* chemical reactions, to engineer functional surfaces with single-molecule precision.
- Applying and developing modern scientific methods (backwards design, active learning) to teach organometallic/physical chemistry courses at undergraduate and graduate levels.

Publications – Preprints

1) Y. Zang, I. Stone, **M. S. Inkpen**, F. Ng, T. H. Lambert, C. Nuckolls, M. L. Steigerwald, X. Roy*, L. Venkataraman*, "In situ coupling of single molecules driven by Au-catalyzed electrooxidation" (submitted)

Publications – Refereed Journal Articles

17) **M. S. Inkpen***, Z.-F. Liu, H. Li, L. M. Campos, J. B. Neaton, L. Venkataraman*, "Non-chemisorbed gold-sulfur binding prevails in self-assembled monolayers" (accepted)

16) G. Lovat, E. A. Doud, D. Lu, G. Kladnik, **M. S. Inkpen**, M. L. Steigerwald, D. Cvetko, M. S. Hybertsen, A. Morgante, X. Roy, L. Venkataraman, "Determination of the structure and geometry of N-heterocyclic carbenes on Au(111) using high-resolution spectroscopy", *Chem. Sci.*, 2019, **10**, 930

15) E. A. Doud†, **M. S. Inkpen†**, Giacomo Lovat, Enrique Montes, Daniel W. Paley, Michael L. Steigerwald, Héctor Vázquez*, Latha Venkataraman*, X. Roy*, "*In Situ* Formation of N-Heterocyclic Carbene-Bound Single-Molecule Junctions", *J. Am. Chem. Soc.*, **140**, 8944

14) H. Li, T. A. Su, M. Camarasa-Gómez, D. Hernangómez-Pérez, S. E. Henn, V. Pokorný, C. D. Caniglia, **M. S. Inkpen**, R. Korytár, M. L. Steigerwald*, C. Nuckolls*, F. Evers*, L. Venkataraman*, "Silver Makes Better Electrical Contacts to Thiol Terminated Silanes than Gold", *Angew. Chem. Int. Ed.*, 2017, **56**, 14145

13) R. Leber, L. E. Wilson, P. Robaschik, **M. S. Inkpen**, D. Payne, N. J. Long, T. Albrecht, C. F. Hirjibehedin and Sandrine Heutz*, "High vacuum deposition of biferrocene thin films on room temperature substrates", *Chem. Mater.*, 2017, **29**, 8663

12) H. Li, M. H. Garner, T. A. Su, A. Jensen, **M. S. Inkpen**, M. L. Steigerwald*, L. Venkataraman*, G. C. Solomon*, C. Nuckolls*, "Extreme Conductance Suppression in Molecular Siloxanes", *J. Am. Chem. Soc.*, 2017, **139**, 10212
    - "1D nanowire is world's worst conductor", *Chemistry World*
    - "Siloxane nanowires are world's worst conductor", *Compound Interest*

11) O. A. Al-Owaedi, S. Bock, D. Costa-Milan, M. Oerthel, **M. S. Inkpen**, D. S. Yufit, A. N. Sobolev, N. J. Long, T. Albrecht, S. Higgins, M. R. Bryce, R. J. Nichols*, C. Lambert* and P. Low*, "Insulated molecular wires: inhibiting orthogonal contacts in metal complex based molecular junctions", *Nanoscale*, 2017, **9**, 9902

10) **M. S. Inkpen***, Y. R. Leroux, P. Hapiot, L. M. Campos and L. Venkataraman*, "Reversible on-surface wiring of resistive circuits", *Chem. Sci.*, 2017, **8**, 4340

9) M. Lemmer, **M. S. Inkpen**, K. Kornysheva, N. J. Long and T. Albrecht*, "Unsupervised vector-based classification of single-molecule charge transport data", *Nature Commun.*, 2016, **7**, 12922

8) **M. S. Inkpen**, S. Scheerer, M. Linseis, A. J. P. White, R. F. Winter, T. Albrecht* and N. J. Long*, "Oligomeric ferrocene rings", *Nature Chem.*, 2016, **8**, 825
   - "Molecule of the Year", the cyclic hexamer was one of seven molecules nominated by *C&EN*, coming third in their online poll (print issue: 2016-12-19)
   - Journal front cover (*Nature Chem.*, **8**(9), 2016)
   - News and Views (R. A. Musgrave and I. Manners, 2016, *Nature Chem.*, **8**, 819)
   - "Presenting a ferrocene Ferris wheel", *C&EN* (print issue: 2016-07-04)
   - "Bringing ferrocene full circle", *Chemistry World* (print issue: 2016-08)

7) **M. S. Inkpen**, A. J. P. White, T. Albrecht* and N. J. Long*, "Complexes comprising 'dangling' phosphorous arms and tri(hetero)metallic butenynyl moieties", *J. Organomet. Chem.*, 2016, 812, 145

6) **M. S. Inkpen**†, S. Du†, M. Hildebrand, A. J. P. White, N. M. Harrison, T. Albrecht* and N. J. Long*, "The unusual redox properties of fluoroferrocenes revealed through a comprehensive study of the haloferrocenes", *Organometallics*, 2015, **34**, 5461

5) **M. S. Inkpen***, M. Lemmer, N. Fitzpatrick, D. Costa-Milan, R. J. Nichols, N. J. Long* and T. Albrecht*, "New insights into single-molecule junctions using a robust, unsupervised approach to data collection and analysis", *J. Am. Chem. Soc.*, 2015, **137**, 9971

4) **M. S. Inkpen**, A. J. P. White, T. Albrecht* and N. J. Long*, "Avoiding problem reactions at the ferrocenyl-alkyne motif: a convenient synthesis of model, redox-active complexes for molecular electronics", *Dalton Trans.*, 2014, **43**, 15287

3) **M. S. Inkpen**, T. Albrecht* and N. J. Long*, "Branched redox-active complexes for the study of novel charge transport processes", *Organometallics*, 2013, **32**, 6053

2) **M. S. Inkpen**, A. J. P. White, T. Albrecht* and N. J. Long*, "Rapid Sonogashira cross-coupling of iodoferrocenes and the unexpected cyclo-oligomerization of 4-ethynylphenylthioacetate", *Chem. Commun.*, 2013, **49**, 5663

1) **M. S. Inkpen**, S. Du, M. Driver, T. Albrecht* and N. J. Long*, "Oxidative purification of halogenated ferrocenes", *Dalton Trans.*, 2013, **42**, 2813

* indicates corresponding author(s), † indicates co-first authors (equal contribution).

Other Publications – Non-Refereed Journal Articles and Book Chapters

2) **M. S. Inkpen** and N. J. Long*, "Metal σ–alkynyl complexes as molecular wires: a comparative study of electron density and delocalisation" in *Molecular Design and Applications of Photofunctional Polymers and Materials,* eds. W. -Y. Wong and A. S. Abd-El-Aziz, Royal Society of Chemistry, 2012 (book chapter)

1) **M. S. Inkpen** and T. Albrecht*, "Probing electron transport in proteins at room temperature with single-molecule precision", *ACS Nano*, 2012, **6**, 13 (perspective article)

Conferences

Invited Oral Presentations

2) *258th American Chemical Society National Meeting*, San Diego, CA, USA; August 25-29, 2019

1) *Minisymposium on Molecular Electronics*, Universität Regensburg, Germany; July 19-20, 2018

Contributed Oral Presentations

11) *ElecNano8*, Université de Lorraine, Nancy, France; May 29-31, 2018

10) *255th American Chemical Society National Meeting*, New Orleans, LA, USA; March 20, 2018

9) *254th American Chemical Society National Meeting*, Washington, DC, USA; August 24, 2017
8) *Quantum Transport in Nanoscale Molecular Systems* (Telluride Science Research Center Workshop), Telluride, CO, USA; August 1, 2017
7) *252nd American Chemical Society National Meeting*, Philadelphia, PA, USA; August 15, 2016
6) *42nd International Conference on Coordination Chemistry*, Brest, France; July 4, 2016
5) *ElecNano*[6], Université Paris Diderot, Paris, France; May 28, 2014
4) *15th Topical Meeting of the International Society of Electrochemistry*, Niagara Falls, Canada; April 28, 2014
3) *12th Ferrocene Colloquium*, Universität Innsbruck, Austria; February 18, 2014
2) *10th Ferrocene Colloquium*, TU Braunschweig, Germany; February 15, 2012
1) *ASPIC*, University College London, UK; July 13, 2011

Poster Presentations

5) *EuCheMS International Organometallic Conference XXII*, Amsterdam, Netherlands; July 10, 2017
4) *13th Ferrocene Colloquium*, Universität Leipzig, Germany; February 22, 2015
3) *11th Ferrocene Colloquium*, Leibniz Universität Hannover, Germany; February 7, 2013
2) *London / SE Region Postgraduate Electrochemistry Symposium*, University College London, UK; May 17, 2011
1) *1st EuCheMS Inorganic Chemistry Conference (EICC-1)*, University of Manchester, UK; April 12, 2011

Teaching and Mentoring Experience

Guest Lecturer, Department of Chemistry, Columbia University 2016
- Co-designed and lectured classes comprised of >25 undergraduate/graduate students.
- Materials Chem. I: *Marcus theory* (1 lecture); Inorg. Chem.: *Arene complexes* (1 lecture).

"Fundamentals of Teaching" Course (10 weeks), Columbia University 2016
- Obtained a firm theoretical background in the foundational principles of teaching.
- Co-designed and co-presented a short (10 min) teachable unit on UV-vis spectroscopy.

Tutoring, Marking, Laboratory Demonstrating, Imperial College London 2009-2014
- Led inorganic chemistry tutorials; demonstrated computational workshops, synthetic labs.

Mentoring/Co-Supervision, Imperial College London and Columbia University 2010-2016
- ≥15 Ph.D., and undergraduate students, including project design (T. Haywood, M. Driver, P. Loxq, G. Fateh-Iravani, M. Balkenhohl, S. Leung, I. Kramberger, N. Rotthowe, M. Lemmer, L. E. Wilson, I. Zulkifly, N. Fitzpatrick, M. Hildebrand, C. Liang, C. D. Caniglia).
- 4 co-authored on recent publications; ≥8 continued to further studies/research.

Academic Service

Manuscript Peer Reviewer: *Nature Rev. Phys.*; *Nano Lett.*; *J. Phys. Chem.*; *Eur. J. Inorg. Chem.*; *J. Phys. Condens. Matter*; *Curr. Opin. Electrochem.* (https://publons.com/a/1475443)

Symposium Organization 2018
- "The Chemistry of Molecular Electronics", 5 sessions at the 255th National Meeting of the ACS in New Orleans, LA, USA (with Latha Venkataraman, Gemma C. Solomon).

Laboratory Specification Advisor, Imperial College London 2014-2015
- Advising architects, engineers, departmental administrators on specifications for future low vibrational/electric noise laboratories at new chemistry building on 'Imperial West' campus.

Academic Interviewing, Imperial College London 2013, 2015

- 17-18 year old Universities and Colleges Admissions Service (UCAS) applicants
- Participated on mock interview panel for a Royal Society University Research Fellowship.

Outreach Activities 2011-present

- Multiple talks/experiment demonstrations, e.g. at Harlem Children's Zone Promise Academy and PhD for a Day (2016, 2017) in New York, Highgate School in London (2011).

Professional Affiliations

- Member of the American Chemical Society (2016-present), Royal Society of Chemistry (2013-present), International Society of Electrochemistry (2014-present).