Dr. Jamie Lynn Ferguson

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Education

Ph.D. "Interactions of Ionic Liquids with Microorganisms, Enzymes, and Polymers," Queen's University Ionic Liquids Laboratory, School of Chemistry and Chemical Engineering, the Queen's University of Belfast, Northern Ireland, UK, Supervisor Kenneth R. Seddon. Aug 2006–May 2010

B.Sc. in Chemistry, Cum Laude (GPA 3.5), Davidson College, North Carolina, USA. 2002-2006
John Montgomery Belk Scholar (Full merit-based)

Ph.D. Research Experience

Two projects investigated ionic liquids as co-solvents for biocatalytic degradation (one fungal, whole-cell and one enzymatic) of different recalcitrant polymers. My main work was to synthesize and characterize ionic liquids for these projects: improving existing synthetic methods to minimize impurities, design of more biocompatible ionic liquids, design of better solvents for these polymers, *etc.* The highly interdisciplinary projects integrated studies of ecotoxicology, biocatalysis, and polymer chemistry.

Two laboratory-based, two-month research visits to the collaborating biotechnology laboratories provided hands-on experience in biochemistry and microbiology. At the Manchester Interdisciplinary Biocentre (University of Manchester, UK) I studied the kinetics of laccase enzymes in aqueous/ionic liquid solvent systems, as well as the biodegradability of ionic liquids in soil microbial cultures. In the Institute for Chemical and Biological Technology (New University of Lisbon, Portugal) I participated in toxicity screenings with fungi (spore inoculations, media preparations, growth monitoring), proteomics analyses of intra- and extracellular proteins, and profiling of secondary metabolites.

Research Skills

Extensive experience preparing, characterizing, and working with ionic liquids. Organic chemistry synthesis skills include working under dry conditions, vacuum, conventional and microwave heat, with ion exchange resins; performing hydrolyses, transesterifications, distillations, *etc.* Most familiar with alkylations of functionalized amines followed by anion exchange *e.g.* column ion exchanges, acid-base titrations, and salt metatheses.

Biology/biochemistry: experience performing steady-state (spectrophotometric) enzyme kinetics experiments, working in sterile conditions (spore suspensions, inoculations, agar plating), preparing buffers, growth media, and protein gels.

Solution-state NMR, FT-IR, ESI-MS, L-SIMS, FAB-MS, and UV-Vis spectrometries; GPC and HPLC chromatographies.

Software: Microsoft Office programs (Excel, Word, PowerPoint), EndNote, chemical drawing software (ChemDraw, ISISDraw, SymyxDraw), Mestrec, Spinworks, Topspin, Rasmol, Mathcad, Mathematica, SciFinder.

Languages

English, German (reading), Portuguese (basic conversational)

Other interests

(Fiddle) music: classical and traditional. I have played violin in classical ensembles since childhood. In Ireland, I play traditional music in many weekly sessions and am occasionally paid for gigs.

Medicine, Sustainable development, Science in education, Green chemistry, Hiking, Camping (& other Outdoors skills)

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Industry-Related Work and Study Experience

Postdoctoral research assistant for confidential work with Petronas — April-June 2010

Presented project updates to QUILL's industrial advisory board of representatives from major multinational oil, chemical, and pharmaceutical companies. — Biannual meetings 2006-2010

One thesis project involved investment from a local business, who intends to commercialize the system for waste polymer breakdown. This project required a balance between purely academic research and the concerns/constraints of a non-scientist commercial investor. — Quarterly meetings 2006-2009

Six weeks' internship with Biodiesel Fuels of Mississippi, Inc. Collected waste vegetable oil from restaurants and helped optimize transesterifications of feedstocks from new restaurant clients. — Summer 2004

Leadership/Service

- Mentored three postgraduate students from biology backgrounds, and one from an engineering background, in conducting ionic liquid syntheses. — 2007-2010
- Conducted research on village water and sanitation practices, during a 6-week program through Davidson College to the Mwandi Mission Hospital, Mwandi, Zambia. — Summer 2004
- Student Advisory Committee Member for Davidson College's Dean Rusk International Studies Program. Co-Editor for its newspaper on international current events ('05/'06). — 2004-2006
- Outdoors Trip Leader, Davidson College. Supervising outdoors trips, e.*g.* 10 days, 12 people, canoeing and camping in the Florida Everglades. — 2004-2006
- Coordinator for the Senior Friends Program, Davidson College (community service with senior citizens). — 2004-2006

Publications

1. L. Rehmannn, E. Ivanova, J. Ferguson, H.Q.N. Gunaratne, K.R. Seddon, and G. Stephens. "Miniaturised Screening for Laccase Activity in Ionic Liquids." *Green Chemistry*, *to be submitted*.
2. M. Tariq, A. Podgorsek, J. Ferguson, A. Lopes, M.F. Costa Gomes, A.A.H. Padua, J.N. Canongia Lopes, L.P.N. Rebelo. "Energetics of aggregation in aqueous pyrrolidinium-based ionic liquids." *Langmuir*, 2010, *submitted*.
3. N. Wood, J.L. Ferguson, H.Q.N. Gunaratne, K.R. Seddon, R. Goodacre, and G.M. Stephens. "Toxicity of Water Miscible and Water Immiscible Ionic Liquids towards *Escherichia coli*." *Green Chemistry,* 2010, *submitted.*
4. G. Adamova, M.J. Earle, J.L. Ferguson, M. Gîlea, K.R. Seddon. "The 2nd International Conference on Biodegradability and Toxicity of Ionic Liquids." *Green Chemistry*, online, 25 March 2010.
5. M. Petkovic, J.L. Ferguson, H.Q.N. Gunaratne, R. Ferreira, M.C. Leitão, K.R. Seddon, L.P.N. Rebelo, C. Silva Pereira. "Novel biocompatible cholinium-based ionic liquids—toxicity and biodegradability." *Green Chemistry*, 2010, 12(4), 643-649.
6. H. Garcia, R. Ferreira, M. Petkovic, J.L. Ferguson, M.C. Leitão, H.Q.N. Gunaratne, K.R. Seddon, Luís Paulo N. Rebelo, C. Silva Pereira. "Dissolution of cork biopolymers in biocompatible ionic liquids." *Green Chemistry*, 2010, 12(3), 367-369. (**cover article*)
7. M. Petkovic, J. Ferguson, A. Bohn, J. Trindade, I. Martins, M.B. Carvalho, M.C. Leitão, C. Rodrigues, H. Garcia, R. Ferreira, K.R. Seddon, L.P.N. Rebelo, and C. Silva Pereira. "Exploring fungal activity in the presence of ionic liquids." *Green Chemistry*, 2009, 11(6), 889-894.
8. G. Adamová, J.L. Ferguson, S. Ng, A.V. Puga, H. Rodríguez, S.M. Rountree, K.R. Seddon and A.A. Tomaszowska. "Conference report: Lake Constance turns green." *Green Chemistry*, 2009, 11(5), 604-608.
9. M. Rebros, H.Q.N. Gunaratne, J.L. Ferguson, K.R. Seddon, G. Stephens. "A high throughput screen to test the biocompatibility of water-miscible ionic liquids." *Green Chemistry*, 2009, 11(3), 402-408.

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Conference Posters

1. M. Petkovic, J. Ferguson, N. Gunaratne, R. Ferreira, K.R. Seddon, L.P.N. Rebelo, and C. Silva Pereira. "Advances in Biocompatible Ionic Liquids." 3rd Congress on Ionic Liquids, May 2009.
2. M. Petkovic, J. Ferguson, A. Bohn, J. Trindade, K.R. Seddon, L.P.N. Rebelo, and C. Silva Pereira. "Can Ionic Liquids alter the Metabolism of Eukaryotic Organisms? The Case of Fungi." 3rd Congress on Ionic Liquids, May 2009.

Courses

• Advanced Course on Biocatalysis, Technical University of Delft, the Netherlands	April 2008	(1 week)
• ACS Green Chemistry Summer School, Washington, D.C.	July 2006	(1 week)
• Sustainable Systems course, Colorado College. Course surveyed topics of sustainable development in agriculture, transportation, and housing.	June 2003	(6 weeks)

Referees

- Professor Kenneth R. Seddon -Ph.D. supervisor
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  The Queen's University of Belfast,
  The QUILL Research Centre, David Keir Building
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  http://quill.qub.ac.uk/index.php/staffastudents/482-prof-k-r-seddon

- Professor Gill Stephens -Principle Investigator of collaborating lab at Manchester Interdisciplinary Biocentre
  Email: gill.stephens@nottingham.ac.uk
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