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Adam Whalley, PhD

Summary of Achievements

- Published 15 peer-reviewed scientific articles
- Awarded the Guthikonda Award in Organic Chemistry which is bestowed upon the top PhD student in their 4th year of study at Columbia University
- Obtained research experience in a variety of industrial and academic environments including pulp and paper research, pharmaceuticals, and organic materials
- Synthesized a wide range of organic molecules for use in organic electronics, metal-organic frameworks, and novel all-carbon materials
- Awarded multiple national awards for industrial employment as an undergraduate
- Served on multiple boards and committees to ensure that the needs of fellow graduate students were met

Education

DOCTOR OF PHILOSOPHY IN CHEMISTRY, COLUMBIA UNIVERSITY — **2009**
Principal Investigator: Professor **Colin Nuckolls** — New York, NY

MASTER OF ARTS IN CHEMISTRY, COLUMBIA UNIVERSITY — **2006**
Principal Investigator: Professor **Colin Nuckolls** — New York, NY

HONOURS BACHELOR OF SCIENCE IN CHEMISTRY, SIMON FRASER UNIVERSITY — **2004**
Research Project Advisor: Professor **Neil Branda** — Burnaby, Canada

Professional Experience

POSTDOCTORAL SCHOLAR IN ORGANIC CHEMISTRY, NORTHWESTERN UNIVERSITY — **PRESENT**
Principal Investigator: **Sir J Fraser Stoddart** — Evanston, IL

SYNTHETIC CHEMIST FOR ASTRAZENECA R&D — **2003**
Synthesized a number of potential drug candidates — Montreal, Canada

RESEARCH SCIENTIST FOR CANADIAN FOREST PRODUCTS (CANFOR) R&D — **2001**
Developed methods to improve procedures used in the pulp and paper industry — Vancouver, Canada

Research Experience

Molecular Electronics

- Fabricated carbon nanotube-based devices designed to measure the conductance of a single molecule
- Designed and synthesized molecules to be connected in single-molecule junctions acting as photosensitive switches and scaffolds for multi-component assemblies
- Produced a vast array of molecules to be measured in single-molecule STM break-junction experiments
- Synthesized molecules for incorporation into quantum dot light-harvesting devices

Polycyclic Aromatic Hydrocarbons (PAHs)

- Utilized palladium catalyzed cross-coupling reactions to generate highly strained bowl-shaped molecules
- Applied synthetic expertise towards the design and synthesis of toroidal carbon nanotubes

Metal-Organic Frameworks (MOFs)

- Developed organic struts for the production of extremely high porosity materials
- Incorporated photo-switchable units into MOF struts to facilitate the addition and removal of gases and other guests from the MOF pores

Drug Discovery

- Synthesized a series of organic molecules as potential analgesic drug candidates

Pulp and Paper Research

- Tested a series of chemicals developed to increase the efficiency of the wood pulp bleaching process
- Investigated the relationship between wood type and paper strength to optimize the cost of paper production

AWARDS AND DISTINCTIONS

2008 Guthikonda Award in Organic Chemistry, Columbia University, awarded to the top 4th year graduate student in the Chemistry Department

2006 J. Malcolm Miller Award, Columbia University, for excellence in teaching by a graduate student in the Chemistry Department

2003 National Sciences and Engineering Research Council of Canada (NSERC) Industrial Undergraduate Student Research Award, Simon Fraser University / Astrazeneca R&D

2001 National Sciences and Engineering Research Council of Canada (NSERC) Industrial Undergraduate Student Research Award, Simon Fraser University / Canfor R&D

1999 Tadeusz Specht Memorial Scholarship in Science, Simon Fraser University

PUBLICATIONS

[1] Deng, H.; Grunder, S.; Cordova, K.; Valente, C.; Furukawa, H.; Hmadeh, M.; Gandara, F.; **Whalley, A. C.**; O'Keefe, M.; Stoddart, J. F.; Yaghi, O. M. "The largest pore apertures in metal-organic frameworks", *Submitted*.

[2] Lilly, G. D.; **Whalley, A. C.**; Grunder, S.; Valente, C.; Frederick, M. T.; Stoddart, J. F.; Weiss, E. A. "Switchable photoconductivity of quantum dot films using cross-linking ligands with light-sensitive structures" *J. Mater. Chem.* **2011**, *21*, 11492–11497. ❋ **Cover Article**

[3] Beuerle, F.; Herrmann, C.; **Whalley, A. C.**; Valente, C.; Gamburd, A.; Ratner, M. A.; Stoddart, J. F. "Optical and vibrational properties of toroidal carbon nanotubes" *Chem. Eur. J.* **2011**, *17*, 3868–3875. ❋ **Cover Article**

[4] Boyle, M. M.; Smaldone, R. A.; **Whalley, A. C.**; Ambrogio, M. W.; Botros, Y. Y.; Stoddart, J. F. "Mechanised materials" *Chem. Sci.* **2011**, *2*, 204–210. ❋ **Cover Article**

[5] **Whalley, A. C.**.; Plunkett, K. N.; Gorodetsky, A.; Schenck, C. L.; Chiu, C.-Y.; Steigerwald, M. L.; Nuckolls, C. N. "Bending contorted hexabenzocoronene into a bowl" *Chem. Sci.* **2011**, *2*, 132–135.

[6] Kamenetska, M.; Quek, S. Y.; **Whalley, A. C.**; Steigerwald, M. L.; Choi, H. J.; Louie, S. G.; Nuckolls, C.; Hybertsen, M. S.; Neaton, J. B.; Venkataraman, L. "Conductance and geometry of pyridine-linked single molecule junctions" *J. Am. Chem. Soc.*, **2010**, *132*, 6817–6821.

[7] Plunkett, K. N.; Godula, K.; Nuckolls, C.; Tremblay, N.; **Whalley, A. C.**; Xiao, S. "Expeditious synthesis of contorted hexabenzocoronenes" *Org. Lett.* **2009**, *11*, 2225–2228.

[8] Kamenetska, M.; Koentopp, M.; **Whalley, A. C.**; Park, Y. S.; Steigerwald, M. L.; Nuckolls, C.; Hybertsen, M. S.; Venkataraman, L. "Formation and evolution of single molecule junctions" *Phys. Rev. Lett.* **2009**, *102*, 126803/1–126803/4.

[9] Hybertsen, M. S.; Venkataraman, L.; Klare, J. E.; **Whalley, A. C.**; Steigerwald, M. L.; Nuckolls, C. "Amine-linked single molecule circuits: systematic trends across molecular families" *J. Phys.: Condens. Matter* **2008**, *20*, 374115/1–374115/14.

[10] Tomaszewski, M. J.; **Whalley, A. C.**; Hu, Y.-J. "A one-pot synthesis of 2,3-dihydro-1H-pyrrolo[3,2-c]quinolines" *Tetrahedron Lett.* **2008**, *49*, 3172–3175.

[11] Park, Y. S.; **Whalley, A. C.**; Kamenetska, M.; Steigerwald, M. L.; Hybertsen, M. S.; Nuckolls, C.; Venkataraman, L. "Contact chemistry and single-molecule conductance: a comparison of phosphines, methyl sulfides, and amines" *J. Am. Chem. Soc.* **2007**, *129*, 15768–15769. ❋ **Highlighted in Nature Nanotechnology** (*Nature Nanotech.* **2008**, *3*, 68–69)

[12] **Whalley, A. C.**; Steigerwald, M. L.; Guo, X.; Nuckolls, C. "Reversible switching in molecular electronic devices" *J. Am. Chem. Soc.* **2007**, *129*, 12590–12591. ❋ **Highlighted in Science** (*Science*, **2007**, *318*, 361–362) **and Nature Nanotechnology** (*Nature Nanotech.* **2007**, *2*, 668–669)

[13] Venkataraman, L.; Park, Y. S.; **Whalley, A. C.**; Nuckolls, C.; Hybertsen, M. S.; Steigerwald, M. L. "Electronics and chemistry: varying single-molecule junction conductance using chemical substituents" *Nano Lett.* **2007**, *7*, 502–506.

[14] Guo, X.; **Whalley, A.**; Klare, J. E.; Huang, L.; O'Brien, S.; Steigerwald, M.; Nuckolls, C. "Single-molecule devices as scaffolding for multicomponent nanostructure assembly" *Nano Lett.* **2007**, *7*, 1119–1122. ❋ **Cover Article**

[15] Sanaur, S.; **Whalley, A.**; Alameddine, B.; Carnes, M.; Nuckolls, C. "Jet-printed electrodes and semiconducting oligomers for elaboration of organic thin-film transistors" *Org. Electron.* **2006**, *7*, 423–427.

CONFERENCES ATTENDED

2011 14th International Symposium on Novel Aromatic Compounds, Eugene, OR | Poster

2011 Foundations of Nanoscience: Self Assembled Architectures and Devices, Snowbird, UT | Poster

TECHNICAL PROFICIENCY

Organic synthesis | Purification techniques | Multi-nuclear NMR spectroscopy | Mass spectrometry | Microwave reactors | Schlenk and glove-box techniques | Solvent purification systems | HPLC | Gas chromatography | FT-IR spectroscopy | Fluorescence and UV-Vis spectroscopy | Differential scanning calorimetry | Isothermal titration calorimetry | Scanning electron microscopy | Chemical vapor deposition | Windows and Mac operating systems

TEACHING EXPERIENCE

NSF-REU Undergraduate Student Mentor, Chemistry Department, Columbia University

- Designed an original research project that could be performed by an undergraduate student in an eight week period
- Advised and taught the student the correct techniques and skills to complete the project

Graduate Teaching Assistant, Chemistry Department, Columbia University

- Performed recitation sessions and graded for a graduate level advanced organic chemistry class
- Planned and taught an advanced organic chemistry lab for ten senior undergraduate students
- Conducted six recitation sections of general chemistry for approx. 30 students each; responsibilities included lecturing, preparing quizzes, holding office hours and grading exams.

LEADERSHIP/VOLUNTEERING EXPERIENCE

***Departmental Representative*,** Graduate School Advisory Council, Columbia University

- Attended monthly meetings to ensure that the needs of graduate students in the chemistry department were met
- Worked with graduate students from many fields to plan social events to bring together people from different departments

Board Member, Columbia Chemistry Careers Committee (C4), Columbia University

- Invited speakers from many scientific and non-scientific disciplines to give presentations to chemistry Ph.D. students and post-doctoral fellows
- Set and maintained budget and planned yearly activities in collaboration with other board members
- Planned symposia, panels, and receptions to provide learning and networking opportunities for graduate students

Colloquium Coordinator, Chemistry Department, Columbia University

- Organized seminars, hosted speakers, and performed A/V setup for visiting faculty prior to weekly seminars

PROFESSIONAL REFERENCES

Professor Colin Nuckolls
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Professor Latha Venkataraman
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