Young Career Focus: Professor Joe B. Gilroy (Western University, Canada)

Background and Purpose. From time to time SYNFORM meets young up-and-coming researchers who are performing exceptionally well in the arena of organic chemistry and related fields of research, in order to introduce them to the readership. This Young Career Focus presents Professor Joe B. Gilroy (Western University, London, Ontario, Canada).

Biographical Sketch

Prof. J. B. Gilroy

Joe Gilroy was raised in Port Alberni, British Columbia, a small town located on the beautiful west coast of Canada, where he attended Alberni District Secondary School. He obtained his B.Sc. (2003) and Ph.D. (2008) degrees from the University of Victoria (Canada) where he conducted research under the tutelage of Professor Robin Hicks as part of a variety of projects involving stable radicals and their metal complexes, ligand design, and molecule-based magnetism. In 2008, he joined the group of Professor Ian Manners at the University of Bristol (UK). His work in the Manners group spanned a number of areas including the synthesis and self-assembly of metal-containing polymers, mechanistic organometallic chemistry, and the chemistry of π-conjugated polymers. Since 2012, Joe has been an Assistant Professor at Western University (formerly known as the University of Western Ontario) in London, Ontario, Canada. For details surrounding his independent research, please see: http://publish.uwo.ca/~jgilroy5/.

INTERVIEW

SYNFORM *What is the focus of your current research activity?*

Prof. J. B. Gilroy My research program is highly collaborative and interdisciplinary. Broadly, we target synthetic functional molecular and polymeric materials with potential applications ranging from alternative energy production and heterogeneous catalysis to fluorescence cell imaging. All of our research projects combine fundamental organic, inorganic, and polymer synthesis with advanced characterization tools and nanofabrication techniques in an effort to address globally relevant research problems.

SYNFORM *When did you get interested in synthesis?*

Prof. J. B. Gilroy As far back as I can remember, I always wanted to 'make' things. My interests advanced from working with wood and metal as a young teenager to chemical synthesis as a high school student. However, it wasn't until I was introduced to a Schlenk line by Dr. Dave Berry at the University of Victoria that I was truly hooked. The notion that careful manipulation of simple chemicals under an inert atmosphere could lead to a vast range of useful materials with tunable properties was truly astonishing to me. I have been involved in synthesis in its various forms ever since.

SYNFORM *What do you think about the modern role and prospects of organic synthesis?*

Prof. J. B. Gilroy In my opinion, organic synthesis has changed significantly over the past few decades, perhaps not coincidentally due to the growing pressure that researchers face to conduct applied rather than fundamental research. I am hopeful that global funding agencies and researchers alike will continue to value (and fund) fundamental organic synthesis projects, as the advances they produce are integral to so many of the 'big picture' problems. Personally, I can't wait to read about the next big discoveries that lead to new anticancer drugs, new synthetic materials that allow for energy to be produced efficiently and without pollution, and catalysts and methodologies that allow for conversion of bioavailable feedstock that do not interfere with the food chain into commodity materials with few (or no) byproducts. Organic synthesis will play a key role in reaching each of these milestones, as well as so many others.

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SYNFORM *Your research group is active in the areas of polymers and materials science. Could you tell us more about your research and its aims?*

Prof. J. B. Gilroy I am very lucky to have a hard-working and talented research team engaged in a variety of projects centered around the synthesis of functional molecular, polymeric, and nanostructured materials. Our current projects include: the synthesis and characterization of stable verdazyl radical polymers for use as hydrophobic hole-transport materials (Figure 1),[1] the production of highly metallized phosphonium polymers as precursors to novel heterogeneous catalysts,[2] the synthesis and evaluation of π-conjugated metallopolymers for use in polymer-based electronics,[3] and the development of redox-active formazanate ligands for use in main-group and transition-metal coordination chemistry.[4,5]

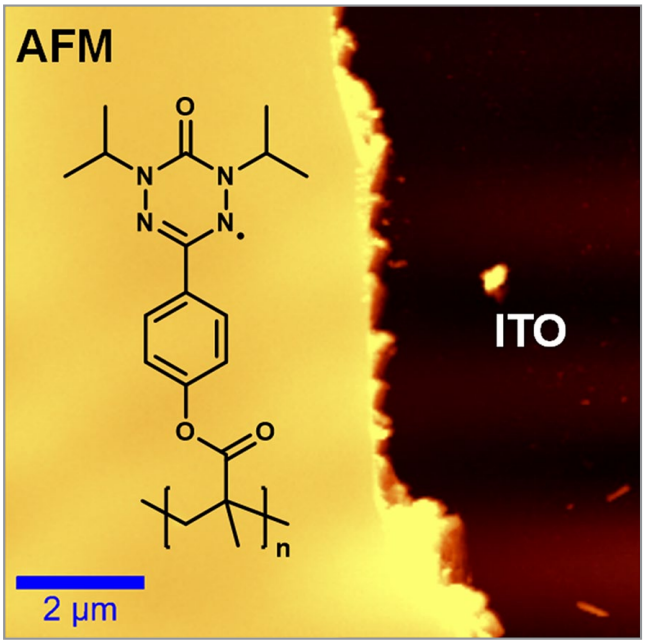

Figure 1 AFM image of a thin film of a 6-oxoverdazyl-based stable radical polymer on indium tin oxide (ITO)

SYNFORM *What is your most important scientific achievement to date and why?*

Prof. J. B. Gilroy This is difficult, as I feel like we're just getting started. So far, I am most proud of our work towards the development of boron difluoride formazanate dyes as alternatives to BODIPYs and related compounds. These complexes can be synthesized in two straightforward and high-yielding steps from commercial starting materials for just a few dollars per gram.[4,5] The spectroscopic and electrochemical properties of the complexes are very sensitive to the nature of the substituents appended to the formazanate backbone (Figure 2), which can be easily modified. We have demonstrated the efficient electrochemiluminescence[6] of these complexes and we are currently exploring their application as donor materials in solar cells and as fluorescence imaging agents. We are excited about the potential of this novel family of compounds and look forward to their future development in our group as well as others.[7]

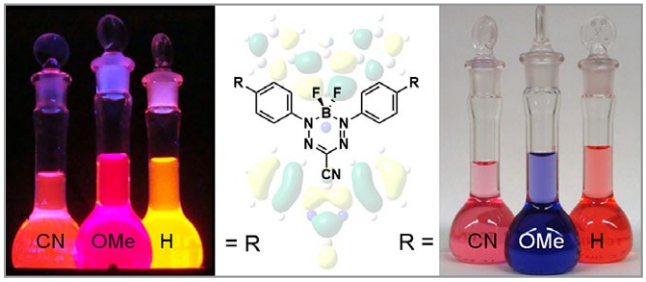

Figure 2 Boron difluoride formazanate complexes with tunable properties under long-wavelength UV irradiation (left) and ambient conditions (right)

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