# Young Career Focus: Professor Alexander W. H. Speed (Dalhousie University, Canada)

**Background and Purpose.** SYNFORM regularly 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 Alexander W. H. Speed (Dalhousie University, Canada).

## Biographical Sketch

*Prof. A. W. H. Speed*

**Alex Speed** was born and raised in Liverpool, Nova Scotia, on the east coast of Canada. His BSc degree (2006) at Dalhousie University, in Halifax, Nova Scotia (Canada) provided his first exposure to chemistry research on a variety of summer projects, first with Professor James Pincock, then with Professor Jean Burnell. In 2008, he joined the Evans group at Harvard for his PhD, where he worked on the synthesis of the natural products peloruside A and spiro-prorocentrimine. In 2012 he began a postdoctoral stay in the group of Professor Amir Hoveyda at Boston College (USA), where he explored the application of *Z*-selective olefin metathesis to the synthesis of disorazole C1. In the summer of 2015, Alex returned to Dalhousie University as an assistant professor, initiating a program to explore main-group chemistry in organic synthesis. Outside of chemistry, Alex's interests include the outdoors, botany, art, LP records, craft beer, and history.

## INTERVIEW

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

**Prof. A. W. H. Speed** My group is interested in helping to bring some concepts from main-group chemistry to organic synthesis, with the hopes of eventually uncovering types of reactivity and selectivity inaccessible to current technologies. My background in the total synthesis of complex molecules helps teach me appreciation for how a larger chemical toolbox enables new strategies for synthesizing molecules.

**SYNFORM** *When did you get interested in synthesis?*

**Prof. A. W. H. Speed** Having a father who was an engineer/woodworker, and a mother who is an artist/musician/teacher, I was raised in a creative household. I had a chemistry set as a child, but rather than reading the accompanying book, I just mixed and observed, fortunately with no big mishaps! Later on, I developed an interest in biology. The chemical structures captivated me, and learning how they were put together led to my interest in organic chemistry. After my first year at Dalhousie, I was fortunate to work in the Pincock lab, which focused on mechanistic photochemistry. We irradiated substrates that took a few steps to make, so I had some great early exposure to synthesis. In subsequent years, I worked in the Burnell lab, whose program focused on stereochemistry and natural product total synthesis. The communication between the students was great, so I learned much beyond my own project. I was definitely hooked on synthesis at that point.

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

**Prof. A. W. H. Speed** Materials generated through organic synthesis underpin our modern society, from medicine to electronics. Developing tools to make molecules more efficiently, or make previously inaccessible molecules will always be in demand. The complexity of some new pharmaceuticals is astounding to me, and the fact they are made on scale is awe-inspiring. Working on small scales, it is tough to predict what might be practical on larger scales, but honest assessment of scope and limitations takes a lot of uncertainty away from potential adopters. Almost all practical advances come from building on somebody else's fundamental research, so preserving basic research is vital, a huge source of stress in today's funding climate. Advances are increasingly interdisciplinary; more researchers today are using light, electrons, or bespoke enzymes in reactions. Absorbing the immense

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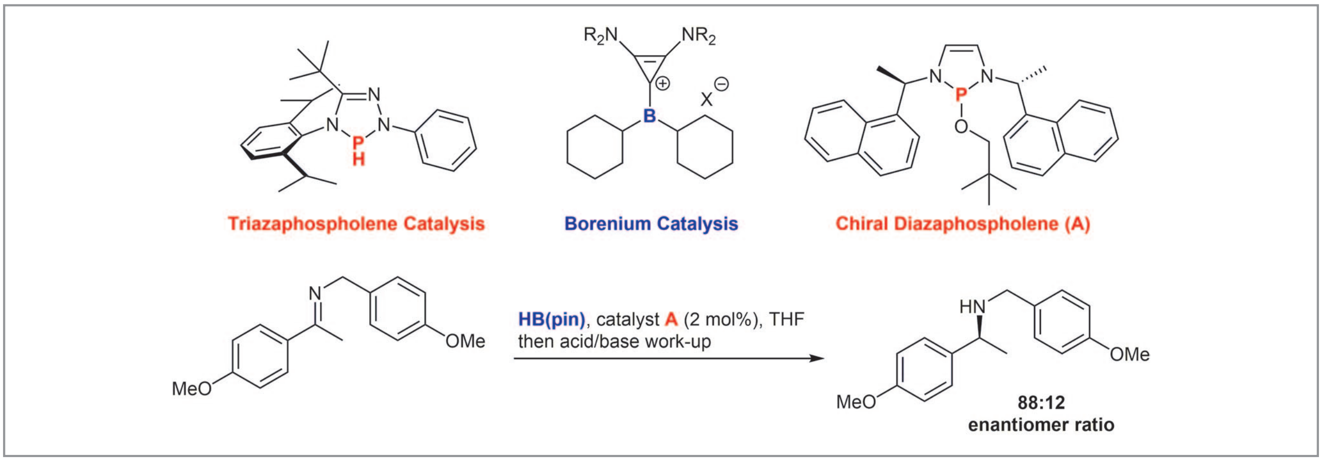


Scheme 1

amount of literature from multiple fields is challenging, so there is tremendous potential for artificial intelligence to help. Unfortunately, solutions considered well known to one set of experts are often off the radar of experts from another field. Better communication there is key. Making these disparate connections will also increasingly be suited to computational analysis. Finally, looking after mental health, and work-life balance is something that is being addressed more and more in the organic synthesis community, which is a positive direction from times past.

**SYNFORM** *Your research group is active in the areas of enantioselective synthesis and catalysis. Could you tell us more about your research and its aims?*

**Prof. A. W. H. Speed** For now, my group is focusing on figuring out how to make some interesting phosphorus and boron compounds (Scheme 1). We are attempting to catalyze rearrangements, and addition of nucleophiles to alkenes. We try a lot of reactions containing motifs that would poison most metal-containing catalysts, to find best-in-class applications. However, organometallic chemistry is amazingly efficient, and some of the compounds we make turn out to be decent ligands for metals as well. I hope this direction of research will grow in my group. My dream from any of those directions is to find a reaction robust and useful enough for widespread adoption by the community. Eventually, with the appropriate funding, I would also like to apply our discoveries to some total synthesis ideas for simple biologically active targets.

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

**Prof. A. W. H. Speed** I am excited about our asymmetric imine hydroboration with diazaphospholenes (Scheme 1). This built on seminal work by Professor Dietrich Gudat (Stuttgart, Germany) and Professor Rei Kinjo (Nanyang Technological University, Singapore), and to the best of my knowledge is the first example of an asymmetric reaction catalyzed by a diazaphospholene. Despite modest enantioselectivity, the low loading and ease of synthesis of these catalysts is nice. We are working on second-generation catalysts to improve selectivity. Diazaphospholenes have fascinating reactivity, and I hope they will take off as tools in synthesis because of their modularity and ease of assembly. I consider myself fortunate to have entered this area of research near the ground floor.