

Young Career Focus: Dr. John Molloy (Max Planck Institute of Colloids and Interfaces, Germany)

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 Dr. John Molloy (Max Planck Institute of Colloids and Interfaces, Germany).

Biographical Sketch



Dr. J. Molloy

Born in Glasgow (Scotland), **John J. Molloy** carried out his undergraduate studies at the University of Strathclyde (UK). During this time, he completed a one-year industrial placement in drug discovery working at the Beatson Institute for Cancer Research (Garscube Estate, Glasgow, UK). John completed his Master's thesis (2014) in the group of Prof. Allan Watson and remained in the same research group at the University of Strathclyde to carry out his doctoral studies where his work focused on chemoselective reactions of organoboron compounds. During his doctoral studies, John was supported with PEER/PECRE funding from the Scottish Funding Council that allowed him to visit the group of Prof. Ryan Gilmour (Münster, Germany) on a three-month secondment working on the geometrical isomerization of alkenes via energy transfer. Following his Ph.D. studies (2018), and a short secondment at the University of St Andrews (UK), John returned to the group of Prof. Gilmour funded by the Alexander von Humboldt foundation. There, John continued his work on the geometric isomerization of alkenes, while also focusing on enantioselective difluorination of alkenes via hypervalent iodine catalysis. After completing his postdoctoral studies (2020), John began his independent research at the Max Planck Institute of Colloids and Interfaces (Germany) working as a group leader in the department of director Prof. Seeberger (2021). During this time, his research has been supported by Der Fonds der Chemischen Industrie (FCI) with a Liebig stipend and also from the Daimler and Benz foundation with the award of a stipend for young researchers. John is also a lecturer at Freie Universität Berlin (Germany).

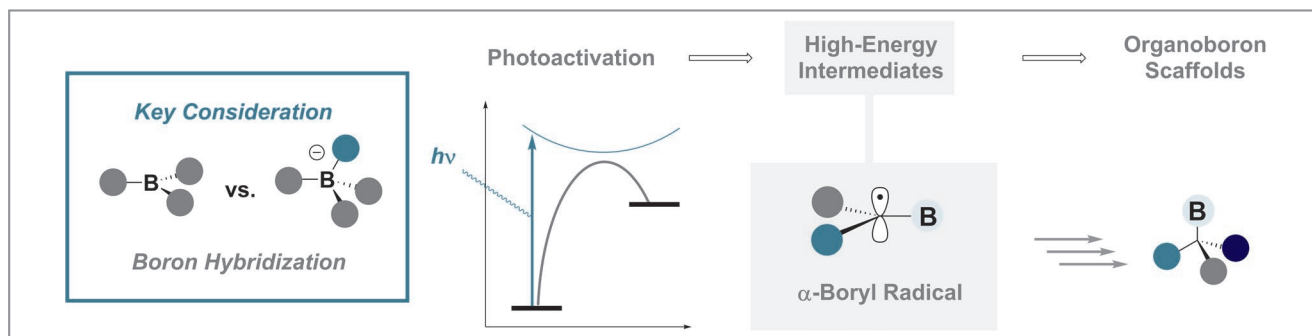
INTERVIEW

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

Dr. J. Molloy Our research group is inspired by the unique properties of boron, both as a synthetic handle to explore chemical space, and as a design feature in medicinal chemistry to interact with biomolecules. Central to boron's utility as an organic substituent is its ability to readily fluctuate between two discrete hybridized forms that can completely change the intrinsic properties of the functionality. This is the key factor that interests our research group. We currently focus on the particular effect boron hybridization can elicit on photochemical and photocatalytic processes.¹ We look to use these properties, not only to enable activation of organoboron precursors to access high-energy intermediates, but also to regulate their subsequent reactivity in chemical transformations (Scheme 1). We recently disclosed a study highlighting the role of the boron p-orbital in enabling the catalyst-free activation of C–I bonds to generate α -boryl radicals using only light and a simple Lewis base additive.² We believe this operationally simple protocol can be strategically merged with other catalysis platforms to construct complex 3D organoboron scaffolds in a streamlined manner. Aside from the construction of boron molecules, we also have a keen interest in their interaction with biomolecules and hope to share some of our developments in the future.

SYNFORM *When did you get interested in synthesis?*

Dr. J. Molloy I guess I would separate this into two sections: theoretical and practical. I was very fortunate at the University of Strathclyde as they have many outstanding and engaging organic chemistry lecturers. I believe it was there that I became deeply interested in organic synthesis from a theoretical standpoint. I've always been really interested



Scheme 1 An overview of the Molloy group's research harnessing boron hybridization to access high-energy intermediates for the synthesis of complex organoboron molecules.

in problem solving and puzzles, and synthesis struck me as exactly this. Ultimately, all the synthetic tools are often there, it is up to you to work out how to build up the molecule or develop novel reactions to get where you want to be. I believe this is ultimately what sparked my interest. Now that I have started giving lectures myself at Freie Universität Berlin, I've tried to replicate the enthusiasm and engagement my lecturers showed me, in the hope of inspiring the next generation to take up organic synthesis.

From a practical aspect this was most certainly during my industrial placement at the Beatson institute for Cancer Research where I really got the bug for making molecules. This was a really small drug discovery unit (10–20 people) which meant I got to see all aspects of a hit-to-lead project. I had two amazing supervisors (Catherine Barber and Duncan MacArthur) who really invested a lot of time in training me in the lab practically. I think having a list of targets and not only designing my own routes to make them, but also seeing how they performed in the biological assays once they were made, was particularly exciting and really spurred me on to make more.

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

Dr. J. Molloy I think it is almost impossible to select one, so I'll select a few that stand out on a personal level. The first would be my first ever publication with Prof. Allan Watson.³ Allan was an outstanding mentor and really had a hand in developing me into the inquisitive scientist I am today. I think on the projects I worked on we were never happy with just developing a new reaction; we were always keen to answer the question "why?". This paper was the first of a very enjoyable time growing as a researcher in his lab.

The second would be my first paper as co-corresponding author during my time as a postdoctoral researcher with Prof. Ryan Gilmour.⁴ Here we answered a long-standing challenge with geometric isomerization of alkenes by energy transfer, extending this away from conjugated styrenyl systems by using boron to regulate reactivity. Ryan was (and still is) an incredible mentor who really believed in me as a scientist and gave me a lot of creative freedom but was always there to give unwavering support and guidance. I think this period was wonderful training for me in moving to an independent career, for which I am incredibly grateful.

The third would be securing an independent position at the Max-Planck Institute of Colloids and Interfaces. I think I can probably speak for all new PIs that there is nothing more daunting/exciting than the first day running your own research group. This was an incredible time for me and I'm extremely grateful to our director Prof. Seeberger for his continued support and guidance in this role.

SYNFORM *Could you tell us something about yourself outside the lab, such as your hobbies or extra-work interests?*

Dr. J. Molloy I still play football as much as I can as it's a great way to take your mind off work and reset while keeping active/fit. The good thing is that in Germany you can usually find a club to play in no matter what level you are at (important for someone from Scotland with very little natural talent). Aside from this I quite like travelling and visiting new cities to explore. My brother lives in Spain and parents live in Cyprus so it is always great to get away and visit sunnier climates. I'm a big advocate for making time outside of the lab. It's always important to have time away, because usually when you return, with a fresh head, problems are a lot easier to solve.

SYNFORM *If you had not become a chemist, what other profession do you think you would have entered?*

Dr. J. Molloy This may come as a surprise, but I was very close to becoming an actor. When I was younger, I was involved in a lot of drama plays/productions and I ended up playing the leading role in a short independent film. The film went to a few film festivals and to everyone's surprise I was nominated for a new talent Scottish BAFTA in 2008. Things really snowballed from there and I had a casting agent and went for auditions for some pretty big roles. Unfortunately, nothing came off before university and my casting agent suggested I continue into university with acting. However, this came with the caveat that it is usually paired with singing, dancing or music. Fortunately for everyone, I have the movement of a refrigerator and a voice only a mother could love and decided a career in chemistry was perhaps better for me (and everyone else).

SYNFORM *What is the most exciting aspect of your job, the one you like the most?*

Dr. J. Molloy This is an easy answer! The most exciting aspect of my job is the students. It is really satisfying to see how much they develop over time, becoming engaged in their projects and excited to share results and talk about science. It is amazing to see them working together, coming up with their own ideas, and solving problems all on their own. I am always so proud of all of them. To see this excitement and know that you play a role in shaping their future is the most rewarding part, even though it is always inevitably sad to see them leave the group and move on to bigger and greater things.

Mattias Fankle

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