**University of Leicester**

**Chemistry PhD studentship**

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| **Additional Supervisor** |  |

**Section 2 – *Project Information***

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| **Project Title** | New Frontiers in Organoborane Catalysis: Functionalisation and Deconstruction of Amines |
| **Project Summary**  |
| Amines are amongst the most important class of molecules in drug discovery and account for around 80% of the molecules used. Therefore, novel methods that produce new amine structures that were previously impossible to synthesise are highly valued in the drug discovery. In this project, we will push the boundaries of organoborane catalysis to develop novel catalytic methods to form, functionalise and deconstruct amines. The project will involve synthetic methodology in several strategic areas, including of heterocycle synthesis, molecular editing and C-H functionalisation. The project will involve:1. **Generating new fundamental knowledge by experimentally investigating the ability of organoboranes to activate amines.** We will explore the hydride abstraction step of new classes of amine starting materials and will be aided by facilities uniquely based in Leicester.
2. **Developing new synthetic methodology for the synthesis of amines**. The scope of the new catalytic reactions will be explored. A critical objective is to develop methodology that is easy to use in a wide range of settings, specifically in drug discovery programmes run by academics, pharma and Contract Research Organisations.
3. **Applying the methodology to real-world applications.** We will use the methodology in late-stage-functionalisation’s and target synthesis to allow researchers direct access to new structures based on those with established biological activity.[4] We will also engage in target synthesis where we will more efficiently form known molecules, as well as develop methods to access entirely novel structures for the first time.

The project will build on the Pulis’ group expertise in main group catalysis.[1-3] The project boarders on the traditional realms of organic and inorganic synthesis and therefore provides a unique training opportunity suitable for careers in industry (e.g. pharmaceutical, agrochemical, etc) and academia. You will receive high level training in synthetic organic chemistry and catalysis, including relevant analytical techniques (primarily NMR spectroscopy and Mass Spectrometry). Funding includes UK fees and UKRI level stipend. Please note that non-UK students will be subject to internationals fees which are not covered by the project funds. Fee waivers are highly competitive and will only be granted in very rare circumstances. International applicants should include information on alternative funding for which they are eligible to cover the international fees. All applicants should include a brief description of previous synthetic chemistry experience (final year projects and/or teaching labs) in their application.Informal enquiries are welcome and should be sent to Alex directly (a.pulis@leicester.ac.uk).  |
| **References** |
| [1] Alvarez-Montoya, Gillions, Winfrey, Hawker, Singh, Ortu, Fu, Li, Pulis, *ACS Catal.* **2024**, *14*, 4856. [2] Basak, Alvarez-Montoya, Winfrey, Melen, Morrill, Pulis, *ACS Catal*. **2020**, *10*, 4835.[3] Basak, Winfrey, Kustiana, Melen, Morrill, Pulis, *Chem. Soc. Rev.* **2021**, *50*, 3720. |