ATLAS: accelerating materials discovery at Imperial College London

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1. Introduction

The discovery and development of new materials systems is often constrained by slow, labour-intensive experimental workflows. ATLAS (Automated high-Throughput pLAtform Suite) is a knowledge-driven automated synthesis and analysis facility based in Chemical Engineering at Imperial College London, established to address this challenge by enabling rapid, data-rich experimentation in the chemical sciences using automation.

2. The ATLAS facility

ATLAS provides researchers in academia and industry with access to high-throughput robotic platforms for chemical synthesis, sample preparation, and characterisation. Three Chemspeed FLEX systems enable parallelised reactions across multiple scales under tightly controlled conditions, including heating, stirring, reflux, filtration, controlled atmospheres, and high-pressure operation. These capabilities are complemented by automated liquid handling and characterisation tools, enabling the rapid generation of high-quality, reproducible datasets.

3. Example applications

ATLAS has supported projects spanning electrocatalysis, polymerisation, assay preparation, and carbon capture and storage materials, demonstrating the flexibility of high-throughput automation across diverse application areas. In one recent collaboration [1], a previously manual pipetting workflow was transferred to an automated liquid handling platform, reducing a 24-day experimental campaign to a single day while improving reproducibility.

Fig. 1: Two of the Chemspeed Technologies FLEX platforms in ATLAS

Conclusion

ATLAS is designed as an accessible, collaborative resource, providing training and expertise to users with little or no prior experience in automation. By lowering barriers to high-throughput experimentation, ATLAS aims to accelerate materials discovery and foster new academic and industrial collaborations.

References

[1] 1. K. Yang, L. C. Lee, H. A. Kotak, E. R. Morton, S. M. Chee, D. P. M. Nguyen, A. Keskküla, C. J. E. Haynes, Chem. Methods 2025, e202400084