DIGIBAT: Bridging the gap between physical automation and AI in energy research

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The development of next-generation battery and Power-to-X technologies is crucial for enabling sustainable energy storage solutions. However, traditional experimental approaches remain labour-intensive and time-consuming, slowing the discovery and optimization of new materials.

DIGIBAT, an automated energy research facility at Imperial College London, aims to transform battery and electrocatalysis research by integrating automation, high-throughput experimentation, and structured data methodologies. The facility delivers a fully automated workflow, from materials synthesis and electrode preparation to coin cell assembly and electrochemical testing, designed to enhance experimental speed, reproducibility, and scalability.

In this work, we introduce DIGIBAT's capabilities, early user case studies, and its roadmap for enabling closed-loop discovery. We highlight how automation and data infrastructure are reshaping the landscape of electrochemical research. By standardizing the experimental loop, DIGIBAT offers a platform for academic and industrial partners to generate the robust datasets necessary to train predictive models for batteries and Power-to-X technologies.

Our goal is to accelerate innovation in energy research by providing a collaborative testbed where manual protocols can be converted into scalable, AI-ready workflows.