

HKU project funded under the NSFC/RGC Joint Research Scheme
Developing Copper Catalytic Materials for Asymmetric Radical Couplings

Principal Investigator (Hong Kong):

Professor Jian HE, Associate Professor, Department of Chemistry, Faculty of Science

Project Summary:

This project aims to develop novel copper-based catalysts to drive chemical reactions with higher efficiency, sustainability, and precision. Copper, an abundant, low-cost, and environmentally benign metal, is particularly well-suited for catalytic applications.

By integrating it with light and specially designed molecular frameworks, the research seeks to control coupling reactions, particularly those involving highly reactive radicals, enabling the synthesis of valuable chemicals with minimal energy consumption and waste. Central to the study is the creation of reusable catalytic materials that operate under mild conditions while achieving high selectivity for desired enantiomers, a capability crucial for the manufacture of pharmaceuticals, agrochemicals, and advanced materials.

The work brings together a collaborative team from Hong Kong and Chinese Mainland, combining expertise in catalyst design, materials science, and reaction mechanisms to overcome current limitations in large-scale chemical production. This initiative is expected to pave the way for greener, scalable, and more cost-effective processes of synthesising complex organic molecules, supporting global efforts toward sustainable chemistry.

港大「聯合科研資助基金計劃」項目
開發用於不對稱自由基偶聯反應的銅催化材料

首席研究員（香港）：

理學院化學系副教授何健教授

項目簡介：

本項目旨在研發新型銅基催化劑，實現化學反應的高效、可持續與精準控制。銅作為地殼中儲量豐富、成本低廉且環境友好的金屬，在綠色催化領域具有巨大潛力。

研究將通過結合光能與專門設計的分子框架，精確調控分子鍵合過程，尤其針對高活性自由基的選擇性反應，從而以最低的能耗與廢物排放合成高附加值化學品。本研究的核心目標，是設計可重複使用、能在溫和條件下運行並具備高度手性選擇性的催化劑結構，這對精密製藥、農業化學品及先進功能材料的生產至關重要。

項目由香港與內地科研團隊共同推進，融合催化劑設計、材料科學與反應機理等領域的專長，以突破當前化工生產的局限。此項合作有望推動形成更綠色、可規模化且經濟高效的複雜有機分子合成技術，為全球可持續化學的發展提供重要支持。