

Lingnan University 2024/2025 SDG Report

SDG 9 – INDUSTRY, INNOVATION AND INFRASTRUCTURE



155
Undergraduate Courses



396
Research Outputs



219
Research Projects and Grants



2.1
Field Weighted Citation
Impact

Lingnan University is deeply committed to advancing SDG 9 – Industry, Innovation and Infrastructure by driving research and innovation that foster resilient, inclusive, and sustainable development. Through pioneering work in renewable energy, advanced battery technologies, and humanitarian innovation, Lingnan integrates scientific excellence with social impact to address pressing global and local challenges. By combining cutting-edge research with community engagement and industry collaboration, the University is building pathways toward sustainable infrastructure, clean technology advancement, and inclusive innovation that contribute to a more equitable and sustainable future.

Renewable Energy Research

Lingnan University is strongly committed to advancing SDG 9 – Industry, Innovation and Infrastructure by driving innovations that support resilient and sustainable energy systems. A prime example of this commitment is the University's pioneering research in next generation solar energy technologies, which accelerates the global transition to clean energy.

A landmark achievement, recently published in *Nature* (Nature 2025, 646, 95101), showcases a major breakthrough in perovskite solar cells (PSCs) by Prof. Shengfan Wu of the Wu Jeh Yee School of Interdisciplinary Studies and his team. They developed a novel toughened self

assembled monolayer, achieving a certified world record power conversion efficiency of 26.92% and unprecedented long-term operational stability. These PSCs exhibit exceptional resilience under harsh industrial testing, marking a crucial step toward their commercial viability and largescale application.

Complementing this success, Lingnan hosts a suite of cutting-edge research projects that address the fundamental challenges of PSC efficiency and stability. Supported by competitive funding from the Hong Kong Research Grants Council (ECS) and the National Natural Science Foundation of China (NSFC), Prof. Wu and his team are exploring strategies such as modulating halide evolution and designing confined 2D/3D heterojunctions to reduce photovoltage losses and improve durability.

Through this multipronged research approach—integrating breakthrough discovery with foundational, grant supported studies—Lingnan University is delivering scientific and technological innovations that advance the renewable energy industry and contribute meaningfully to building a sustainable and resilient global infrastructure.

Ultra-Safe Aqueous Battery Research

While lithiumion batteries dominate today's energy storage market, their future development faces constraints due to safety risks and limited lithium and cobalt resources. To address these challenges, Prof. Xi Chen and Prof. Ze Chen of the Wu Jeh Yee School of Interdisciplinary Studies lead pioneering research on aqueous zinc batteries, offering a safer, cost effective, and more sustainable alternative.

By combining a zinc metal anode with low cost aqueous electrolytes and high energy density chalcogen/halogen cathodes, the team's design achieves intrinsic safety, enhanced cost efficiency, and improved material sustainability. The research spans fundamental electrochemistry, advanced electrode engineering, and scalable manufacturing strategies—focusing on interfacial stabilization, dendrite suppression, and optimized electrolyte formulations to extend cycle life and maximize energy density while preserving aqueous safety advantages.

Collaborations with industry partners and pilot scale testing have validated the batteries' strong performance in grid storage, electric mobility, and portable electronics. By integrating computational screening with high throughput synthesis and characterization, the team has also accelerated development cycles and reduced production costs.

This multidisciplinary effort represents a significant step toward ultrasafe, low cost, and sustainable energy storage technologies that can be widely applied across multiple sectors. It directly supports SDG 9 – Industry, Innovation and Infrastructure by driving progress in resilient, safe, and innovative energy systems for a sustainable future.

Humanitarian Innovation and Technology for Inclusive and Sustainable Communities

The United Nations University (UNU) Hub on Humanitarian Innovation and Technology (HIT) at Lingnan University, in collaboration with the Office of Service-Learning (OSL) and the Lingnan Entrepreneurship Initiative (LEI), is advancing SDG 9 – Industry, Innovation and Infrastructure through practical innovations that improve living conditions, inclusivity, and safety for under-resourced communities in Hong Kong.



Kitchen Range Hoods for Subdivided Units and Transitional Housing: UNU HIT has developed a low-cost indoor range hood specifically for subdivided units (SDUs), particularly those without windows or adequate ventilation. Unlike conventional models, the new design integrates a HEPA filter and grease trapper that effectively remove harmful particles and oil vapors generated during cooking, reducing airway irritation and improving indoor air quality for vulnerable residents such as children and the elderly.

Low-Cost Dehumidifier for Subdivided Units: Working with the Department of Psychology and OSL, UNU HIT is developing an affordable, compact dehumidifier suitable for space-limited SDUs. The design can be paired with Lingnan's PureAura air purifier, minimizing the device's footprint while improving air quality and comfort in humid living environments.

Smart Food Waste Collection Cart: Through community-engaged projects, SL students have redesigned a smart food waste collection cart using eco-friendly, durable, and lightweight materials. The improved design enhances ease of use, mobility, and ergonomics, reducing strain on collectors while increasing efficiency and boosting weekly waste collection volumes.

Modest Professional Fashionwear for Inclusivity: A student team nurtured under the LEI program won the HK Social Enterprise Challenge with a fashion-for-good initiative that promotes inclusivity, employability, and sustainability. By employing ethnic minority women to create culturally inspired professional and casual wear, the project fosters cross-cultural understanding and empowers marginalized communities through meaningful employment.

AI-Based Remote Monitoring for Domestic Safety: Another LEI-incubated student team, admitted to the Cyberport University Partnership Programme, has developed an AI remote monitoring system capable of detecting potential violent behavior against children and the elderly. This technology applies advanced analytics to home footage to support early intervention and protection of vulnerable individuals.

Together, these initiatives exemplify Lingnan's commitment to human-centered innovation, combining technology, social impact, and entrepreneurship to build resilient and inclusive communities in alignment with SDG 9.