

Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2022-109
Project Title:	Environment and Conservation Fund - Towards Livable & Healthy City: Solar-Driven Exhaust Fume (NO _x) Purification Engineering for Eco-Friendly Transportation and Electricity Generation in Hong Kong
Principal Investigator:	Professor Phillips David Lee, Department of Chemistry, The University of Hong Kong
Total Approved Grant:	\$1,083,000
Duration:	1/12/2023 to 30/11/2026
Project Status/Remarks:	On-going
Project Scope:	<p>Total emissions of NO_x reach 70,000 tonnes in Hong Kong every year. To improve overall air quality, the key challenge is to develop a highly efficient green technology for converting toxic NO_x to NO₃⁻. Solar-driven photocatalysis is expected to be an ideal approach to degrade NO_x without fossil fuel consumption and pollutants emission.</p> <p>This project aims to provide a sustainable air purification method via photocatalytic NO_x oxidation to improve the outdoor air quality, particularly for local road transport (i.e. private cars, taxis and public buses) and electricity stations in Hong Kong. Porous materials hold great potential for highly efficient photocatalytic NO_x purification as the tuneable morphology, active sites and NO_x absorption capacity. Currently, for the high-concentration NO_x treatment, photocatalysis shows low efficiency due to the intrinsic charge carriers recombination and insufficient driving force for the production of active radicals. In this proposal, atomic engineering (via single atoms and defects) and interfacial construction (via Z-Scheme or in-built electric field) will be carried out to enhance the efficiency and durability of NO_x conversion by porous materials. And in-situ characterisations will be used to monitor the generation and decay dynamics of radicals from the femtosecond to microsecond time scales.</p>
Summary of the Findings/ Outcomes:	To be available upon completion of the project