Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2022-76
Project Title:	Environment and Conservation Fund - Versatile PV technology using super-hygroscopic hydrogel membrane for synergetic power generation, water harvesting, and dehumidification in Hong Kong
Principal Investigator:	Dr Wu Wei, School of Energy and Environment, City University of Hong Kong
Total Approved Grant:	$485,000
Duration:	1/1/2024 to 31/12/2025
Project Status/Remarks:	To be commenced
Project Scope:	To combat global warming, Hong Kong aims to become carbon neutral by 2050. Solar photovoltaic (PV) plays a leading role in the low-carbon energy transition, but passive cooling is essential for enhancing efficiency and reliability. Freshwater scarcity is another big challenge in Hong Kong, and atmospheric water harvesting is promising due to the humid air. Besides, the heating, ventilation, and air conditioning (HVAC) energy consumption is quite high due to the high humidity in Hong Kong and sustainable dehumidification technologies are urgently needed. Therefore, a well-maintained energy-water-environment nexus is critical to achieving a sustainable living environment. To solve these problems all in one, this project is focused on the study and development of a novel versatile PV technology using a super-hygroscopic hydrogel membrane for synergetic power generation, water harvesting, and dehumidification. This technology shows many advantages: (1) high PV electric efficiency, (2) energy-free atmospheric water harvesting, (3) highly efficient refrigerant-free dehumidification, (4) synergetic functions with an all-in-one structure, and (5) low cost and high sustainability. This project will provide a sound technology to address the energy-water-environment nexus towards carbon neutrality, sustainable water supply, and healthy indoor air quality in Hong Kong.
Summary of the Findings/ Outcomes:	To be available upon completion of the project