Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2021-86
Project Title:	Development of novel photocatalytic technology for solar-driven simultaneous hydrogen production and pollutant degradation from wastewater
Principal Investigator:	Dr Ho Cheuk Lam, Department of Applied Biology and Chemical Technology, The Hong Kong Polytechnic University
Total Approved Grant:	$500,000
Duration:	1/9/2022 to 31/8/2024
Project Status/Remarks:	On-going
Project Scope:	Energy crises and environmental pollution are two serious threats to modern society like Hong Kong. Solar-driven photocatalysis has opened a brilliant chapter to realize both issues. The photocatalysts have shown their remarkable influence in the hydrogen fuel production and removal of pollutants from wastewater with least working labor and minimum cost. Although much efforts have been paid in investigating new photocatalytic systems solely based on semiconductor catalysts, their limited tunability in electronic/optical properties, insufficient-stability and low efficiency in aqueous environment limit their large-scale applications. Exploitation of efficient, photostable and scalable photocatalysts for both applications remain the most challenging task. In this proposal, a series of coordination cages comprising of redox-active and light-harvesting building blocks will be explored as photocatalysts for photostable and highly-active photocatalytic-systems for hydrogen-production and pollutant degradation from wastewater simultaneously. These photocatalysts are easily to be synthesised in large scale by reacting metal ions with functionalised thiosemi-carbazone bidentate ligands. Solar-driven water-splitting and pollutant degradation will be achieved by using photocatalytic reactor wherein photocatalyst particles suspended in wastewater function as microphotoelectrodes, facilitate water-reduction and pollutant degradation on their surface. Optimisation of the photocatalytic systems will be achieved through systematic modification of cages' structures and device settings.
Summary of the Findings/Outcomes:	To be available upon completion of the project