

THE EDUCATION UNIVERSITY OF HONG KONG
FACULTY OF LIBERAL ARTS AND SOCIAL SCIENCES

Research Output/Impact Prize for the Dean's Research Fund 2017-18

**Brief Introduction of Awardee's
Research Publication/Study and Future Research Development**

Awardee (Dept): Dr. Leung Chi Fai, Assistant Professor (SES)

Publication Title: Photocatalytic Conversion of CO₂ to CO by a Copper(II)
Quaterpyridine Complex

A. Briefly introduce your research publication/study for which you have received the prize.

The invention of efficient systems for the photocatalytic reduction of CO₂ comprising earth-abundant metal catalysts is a promising approach for the production of solar fuels. One bottleneck is to design highly selective and robust molecular complexes able to transform the gas. The Cu(II) quaterpyridine complex [Cu(qpy)]²⁺ is found to be a highly efficient and selective catalyst for visible-light driven CO₂ reduction in CH₃CN using [Ru(bpy)₃]²⁺ as photosensitizer, BIH/TEOA as sacrificial reductant. The photocatalytic reaction is greatly enhanced by the presence of H₂O (1–4% v/v), and a TON of >12,400 for CO production can be achieved with 97% selectivity, which is among the highest of molecular 3d CO₂ reduction catalysts. Results from Hg-poisoning and dynamic light scattering (DLS) experiments suggest that this photocatalysis is homogenous. To the best of our knowledge, the [Cu(qpy)]²⁺ catalyst reported herein is the first example of molecular Cu-based catalyst for the photoreduction of CO₂.

B. How you used/will use your prize and perhaps its usefulness to your research development?

The award will be very meaningful and represents the support of FLASS for cutting-edge scientific investigations for pursuing the development of a sustainable future. The prize will be used for continuing my investigation on the photochemical conversion of carbon dioxide into fuels and valuable chemicals.

C. Expected research outcomes/outputs/impacts arising from this prize.

New catalytic systems for CO₂ conversion and valorization will be reported. A peer-reviewed SCI publication will be submitted as result.