For the reference of University System of Taiwan Date: 6 November 2015

City University of Hong Kong -School of Energy and Environment

List of Summer Internship Projects 2016 (Program date: 6/20-8/6, 2016)

	Supervisor	Topic Title	Short Description	Prerequisites
1	Professor Michael Leung	Photocatalytic fuel cell	The architecture of photocatalytic fuel cell (PFC) is composed of two major coupling parts: a photocatalytic reactor and a fuel cell. The theory is that in the photocatalytic reaction, the photo-induced electrons flow via the external circuit as an electricity supply due to the potential bias in the fuel cell. Thus, the fuel cell electrochemical process can boost the separation of photocatalytic electron-hole pairs. More photo-induced holes remaining at the photoanode become available to enhance the degradation of pollutants and generate more electrons. Therefore, the photocatalytic process can supply more electrons for the fuel cell electrochemical reactions at the cathode. Multiple electrochemical reactions may occur at the cathode, such as reduction of protons to generate hydrogen. The above chain reactions explain the PFC synergistic effects. The objective of this project is to obtain the characteristics of PFC waste degradation and energy production.	Experience in chemistry laboratory experiment.
2	Dr. Nicky Lam	Investigation of effects of "One Belt And One Road" on regional air quality	The aim of the study is to investigate the air quality impacts associated with the newly proposed global logistic plan: One Belt And One Road. In the study, student will be asked to forecast the future marine travel pattern and estimate the overall ship emissions from the belt.	Good English is preferable
3	Dr. Nicky Lam	Impacts of "Joss paper culture" on springtime air quality during Ching Ming Festival	Open burning from the Joss paper practice has believed to contribute large amount of PM2.5 during the springtime. In this study, we will analyze data from Tai Mo Shan observation station to study its potential impacts on local air quality during Ching Ming Festival.	Good English is preferable

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4	Dr. Wey Yang Teoh	Fabrication of high efficiency metal clusters-based solar cells	The project investigates the design of novel metal clusters-sensitised solar cells. Metal clusters, consisting of tuneable 15-150 atoms (< 2 nm), are a new class of materials that are different from their nanoparticles cousin and exhibit semiconductor characteristics. It is exactly such characteristic that allows potential exploitations as effective sensitisers in a chemical solar cell. In this project, we aim to design metal clusters based on Au, Ag and Cu, and investigate their efficiencies in the harnessing of solar energy. Here, we will also investigate their compatibility with different redox mediators, including the non-corrosive cobalt complexes-based electrolyte that warrants high open circuit voltage of the cells.	This is an experimental-based project. Candidate should have strong knowledge in Chemistry, and preferably with some interest in Semiconductor Physics.
5	Dr. Wey Yang Teoh	Designing metal clusters-based composite photocatalysts for the remediation of gaseous pollutants	The project investigates the design of metal clusters-sensitised photocatalysts for the degradation of volatile organic carbons (VOCs). Prolonged indoor exposure of VOCs such as acetaldehyde and methanol, be it in buildings or aircraft cabins, pose health concerns to the occupants, including the sick building syndrome. Here, we aim to design metal (Au, Ag, Cu) clusters to sensitise wide bandgap photocatalysts such as TiO2, WO3 and BiVO4, such that they can function efficiently under indoor visible light. Manipulation of the size of the metal clusters has direct effects on the light absorption as well as its charge transport kinetics.	This is an experimental-based project. Candidate should have strong knowledge in Chemistry, and preferably with some interest in Semiconductor Physics.
6	Dr. Patrick Sit	Computational quantum mechanical study and design of energy storage systems	Computational modeling techniques have become powerful tools for the study of important scientific and technological problems due to the ever-increasing computing power and the development of efficient and accurate methodologies. In particular, first-principles density-functional simulations have been extensively used to provide realistic prediction of material properties and to unravel atomic-scale details of reaction mechanisms relevant to energy applications. This project focuses on the study of reaction in systems important for energy storage and the design of novel materials for applications like hydrogen production, carbon dioxide to fuel conversion and lithium-ion batteries.	Interested students should be perusing a degree in Physics, Chemistry, Materials Science or other related disciplines. Knowledge in quantum mechanics is required. Experience in atomistic-scale computational modeling and density functional theory is a plus.