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

Awardee (Dept): Dr. Chow Cheuk Fai Stephen, Associate Professor (SES)
Publication Title: A Multifunctional Bimetallic Molecular device for Ultrasensitive Detection, Naked-Eye Recognition, and Elimination of Cyanide Ions

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

Cyanide is a useful but danger chemical. It is commonly use in industrial activities, such as mining, metallurgy, and photographic processing, however, one percent of tea spoon amount could cause a fatality to a normal human being. An estimation reveals that the total production of cyanide worldwide is about 1.4 million tonnes per year. Since 1975, more than 30 large-scale incidents involving significant contamination of water sources have resulted in severe financial, political, and health costs. Decades on, the issue remains unsolved.

But the situation is changing, we have successfully invented a 3-in-1 molecular device with multi-functions: “Detection, Amplification of signal, and Elimination” for handling of trace cyanide ions found in water. The research work funded by the Hong Kong Research Grants Council was published in Chemistry A European Journal 2015, 21, 12984.

This new technology is developed through a special molecular design, called indicator/catalyst displacement assay (ICDA), multifunctional properties were incorporated into an iron-copper containing supramolecule. The device when detecting cyanide in the water bodies will give naked eye observable color signal and subsequently degrades the cyanide. The device is even smart enough to degrade the pollutant automatically when cyanide reaches a particular level.
B. *How you used/will use your prize and perhaps its usefulness to your research development?*

| This discovery may shed new light on how to real-time monitor and treat other dangerous chemical wastes. The scientific background of how the device can take up multi-functions simultaneously for detection, amplification, and elimination upon detection of cyanide is now being understood. The researchers will further explore the feasibility of designing other new smart devices for detection and degradation of various hazardous chemical wastes, such as oxalate, azo dyes, carboxylic acids, and organophosphate pesticides. Finally, the team will continue to establish this new technology on the complicated industrial wastewaters, which is composed of a mixture of the toxics rather at high concentrations. |

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

| By gathering all the resources, we hope to create new perspectives and ideas to solve the problems of toxic substances. Furthermore, we would like our research results to be used to improve our society. |