THE DEPARTMENT OF CHEMISTRY

Presents

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2014 Canadian Catalysis National Tour Award

"Nanocomposites as sunlight-driven photocatalysts for H_2 generation from water splitting and for air depollution"

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ABSTRACT: Due to the depletion of fossil fuels and the serious environmental problems accompanying their combustion, a new form of energy that is clean, renewable, low-cost and a viable alternative to fossil fuels is urgently needed. The direct conversion of sunlight into fuels (i.e. solar fuels), and the degradation of water/air pollutants under sunlight with the aid of an artificial photo-catalyst is an attractive prospect, considering that in a single hour the sun delivers energy sufficient for all human activities in an entire year. However, a major challenge lies in designing efficient sunlight-driven photocatalyst system.

Recently, our group has designed a variety of novel nanomaterials with controlled size and shape, which have potential applications in catalysis and photocatalysis. In this talk, I will select three new types of nanocomposites which were recently developed in our group: **(i)** CdS-titanate-Ni nanocomposites for H_2 generation under visible light from water splitting: In this system, the intimate contact between CdS nanoparticles and titanate nanodiscs as well as Ni selectively located on the titanate surface, as a key role for high H_2 generation will be discussed. **(ii)** 3D-hollow Au/TiO_2 nanospheres for air depollution under sunlight: This designed photocatalyst possesses several exceptional properties including high surface area, photonic behavior, multiple light scattering and strong visible-light absorption, owing to its unique structure. As a result, an excellent photo-activity for air depollution has been achieved. **(iii)** Hollow double-shell TiO_2/electron storage material (ESM) system for air depollution both under sunlight and in the dark: To overcome the drawback of photocatalysis that they can only function under light irradiation, we designed a new system which possesses large sunlight absorption and high electron storage capacity. Photo-excited electrons are stored in the day light and further discharged in the dark to form H_2O_2 for organic pollutant degradation. Thus, this system can function both during the day and during the night. The design of this type of materials will be discussed. In addition, the potential applications of these materials in photocatalysis will be also highlighted.

Tuesday, February 24, 2015
2:30 – 4:00
AT 2015

Everyone is welcome to attend