SCHULICH SCHOOL OF ENGINEERING | Department of Chemical & Petroleum Engineering

# Trong-On Do

**PhD**

RESEARCH TALK

## Nanocomposites as sunlight-driven photocatalysts for H2 generation from water splitting and for air depollution

**Monday, March 16, 2015**
**2:30PM - 3:30PM**

**Taylor Family Digital Library**
**Gallery Hall**
**University of Calgary**

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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 H2 generation under visible light from water splitting: In this system, the intimate contact between CdS nanoparticles and titanate nanodiscs as well as Ni selectively

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located on the titanate surface, as a key role for high H2 generation will be discussed. (ii) 3D-hollow Au/TiO2 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 TiO2/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 H2O2 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.

# Trong-On Do

## PhD

Trong-On Do received his MSc in 1986 and PhD in 1989 from University of P. and M. Curie (Paris 6). After a period at Brunel University (UK) and the French Catalysis Institute (France), he moved to Laval University in 1990. He then spent two years 1997-1999 in Prof. Fujishima's group at Tokyo University under the Japanese STA Fellowship Award before joining again Laval University as a professor associated with Prof. Kaliaguine's NSERC industrial chair. Trong-On's research is focused on the design and synthesis of innovative and smart materials and their application in heterogeneous catalysis and renewable energy.

Trong-On recently made a pioneering contribution towards the efficient photocatalytic production of H2 from water splitting and the degradation of air pollutants under solar light irradiation. He is also a major contributor in the field of zeolite-based materials including controlled-size nanozeolites and hybrid zeolite/mesoporous molecular sieve materials. He has published over 120 papers and review articles in refereed journals and holds 5 international patents.

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