

DEPARTMENT OF CHEMISTRY

1ST GRADUATE STUDENT SYMPOSIUM

☀ 7 DECEMBER 2004, TUE ☀ 10AM – 4PM ☀ SR28 ☀

The Graduate Student Symposium is conducted twice a year in December and May. Graduate students taking the new *Graduate Seminar Module in Department of Chemistry (CM5198)* will be presenting interesting topics outside their research areas but related to Chemistry, and assessed by the appointed examination panel formed by their supervisors and two other faculty members.

No registration is required. Admission is free and all are welcome to attend.

What is CM5198?

The Graduate Seminar Module (CM5198) is introduced as a compulsory module for graduate students matriculated from August 04 onwards to encourage graduate students to participate in seminars and help them to improve their presentation skills. It makes up of 2 components:

- (1) Attend departmental seminars
- (2) Deliver a 20-30 mins talk followed by 5-10 mins Question and Answer session in the Graduate Student Symposium

☀ SYMPOSIUM PROGRAMME ☀

10.00am to 10.15am	Open Address by Asst Prof Yip Hon Kay, John
10.15am to 10.45am	Structure, Function and Production of Lutein Mr Liu Yeting
10.45am to 11.15am	Coated Nanoparticles Miss Tan Yen Ling
11.15am to 11.45am	The Application of Gold Catalysts to Automotive Pollution Abatement Miss Yen Swee Kuan
11.45am to 12.15pm	Supramolecular Chemistry of Gases Miss He Lin
12.15pm to 12.45pm	Whole Cell Fermentation for The Large Scale Synthesis of Chiral Intermediates and Pharmaceuticals Mr Fow Kam Loon @ Foo Kam Loon
12.45pm to 2.00pm	<i>Lunch Break</i>
2.00pm to 2.30pm	Water Activity: Concept, Measurement, and Applications Miss Vania Octaviani Selomulyo
2.30pm to 3.00pm	Laser in Spectroscopic Techniques Mr Iyer Shreedhar
3.00pm to 3.30pm	Metals in Medicine Miss Nguyen Thi Thuy Linh

End of 1st Graduate Student Symposium

☀ ABSTRACT ☀

Structure, Function, and Production of Lutein

Mr Liu Yeting

Lutein (3R,3'R,6'R- β , ϵ -carotene-3,3'-diol) has a 40 carbon structure with β - and ϵ -ionone rings. It plays the roles of antioxidant and blue light filter both *in vitro* and *in vivo*. In numerous epidemiological cases, its high dietary intake has been associated with lower risk of developing cardiovascular disease, several types of cancers, cataracts and age-related macular degeneration. Dark green leafy vegetables are the lutein rich dietary sources. The commercial production of lutein involves the extraction and purification from natural lutein source Marigold petals.

Coated Nanoparticles

Miss Tan Yen Ling

Silica-coated nanoparticles have enormous applications in bioanalytical, biotechnology, and biomedical field. One of the methods to produce silica-coated nanoparticles is by precipitating nano-sized cores from reagents dissolved in the aqueous compartment of a water-in-oil microemulsion. The nanoparticles core produced is of a predetermined, extremely uniform size and shape. The cores are subsequently coated with silica using a silicating agent, which can be customized by derivatizing various chemical groups onto the silica coating to tailor for different applications.

The Application of Gold Catalysts to Automotive Pollution Abatement

Miss Yen Swee Kuan

The special nature of gold chemistry and gold catalysis came through clearly, and there is promise for applications in areas such as pollution control, chemical reaction, fuel cell systems and sensors. Some of these applications may be new, and could be based on the low temperature activity of supported gold or the novelty of the organic transformations catalysed by soluble gold species. The application of gold catalysts to the oxidation of carbon monoxide has been studied extensively. A significant feature of gold-based catalysts is the low temperature oxidation of carbon monoxide, where the catalysts display activity at temperature as low as $-70\text{ }^{\circ}\text{C}$ [1]. Gold catalysis has some unusual features, some of which are unique and the mechanisms of the various reactions, particularly of carbon monoxide oxidation, which has received more attention than most of the others. The activity of a gold catalyst depends critically on its method of preparation and the conditions under which it is calcined and used. Various oxidation states of gold may be involved and the interface between the small gold particles

and the support seems important. The support plays a key role in supplying oxygen to the gold, thereby increasing its activity. Method of preparation, choice of support(s), gold particle size and calcinations and storage conditions would all need to be carefully defined.

Supramolecular Chemistry of Gases

Miss He Lin

Molecular recognition of gases is an emerging area of chemistry. Supramolecular chemistry helps us to understand how gases interact with biological molecules and offers delicate insights into the mechanisms of their physiological activity. Principles of molecular recognition have been used for gas sensing, and have provided fundamental knowledge about the structure and dynamics of receptor–analyte complexes, and novel materials for gas sensing and storage have been developed. Supramolecular chemistry is also enabling us to learn how to transform gases into synthetically useful reagents.

Whole Cell Fermentation for the Large Scale Synthesis of Chiral Intermediates and Pharmaceuticals

Mr Fow Kam Loon @ Foo Kam Loon

Nature is the master organic chemist. Until now, there is no synthetic chemistry method that is as efficient as the living organisms, in terms of regiospecificity and stereospecificity, in production of organic compounds. Plants can produce a lot of useful secondary metabolites. Thus, plants are one of the most important sources of chemicals including flavours, dyes, pharmaceuticals and agrochemicals. However, increasing regulatory requirements and increases in labour cost in obtaining pharmacological important substances from plants have increased the usage of plant cell culture for the production of these products. The distinct advantage of plant cell culture against conventional agriculture is not affected by environmental factors. Furthermore, the productivity could be increased by using scientific strategies. This seminar will discuss about the economics, methods, facilities and strategies for productivity increase. Some applications of plant tissue culture for large scale synthesis of pharmaceuticals and chiral intermediates will be presented.

Water Activity: Concept, Measurement and Application

Vania Octaviani Selomulyo

The term 'water activity' (a_w) describes the equilibrium amount of water available for hydration of materials. It has particular relevance in food chemistry and preservation. The multi-ingredient nature of food and its

processing commonly result in a range of water activities being present. Foods containing macroscopic or microstructural aqueous pools of differing water activity will be prone to time and temperature dependent water migration from areas with high a_w to those with low a_w ; a useful property used in the salting of fish and cheese but in other cases may have disastrous organoleptic consequences. Control of water activity is very important in the food industry as low water activity prevents microbial growth and hence increases shelf life, causes large changes in textural characteristics such as crispness and crunchiness (*e.g.* the sound produced by 'crunching' breakfast cereal disappearing above $a_w = 0.65$) and changes the rate of chemical reactions.

Laser in Atomic spectroscopy **Mr Shreedhar Iyer**

LASER, stands for Light Amplification by Simulation of Emitted Radiation. This powerful source of light has found innumerable applications in the modern world. The presentation starts with some basic information about lasers. The presentation then reviews several novel uses of laser in atomic spectroscopy. It briefly discusses the basic processes involving the interaction of laser radiation with atoms and the measurement approaches. The following laser based techniques have been discussed in brief –

- 1) Laser based absorption technique
- 2) Laser based fluorescence technique
- 3) Laser based ionization technique

Each of these techniques has been discussed for their principles, instrumentation and applications. Finally the presentation concludes with future use of lasers in atomic spectroscopy and a comparison of the characteristics of various atomic methods for trace elements.

Metals in Medicine **Miss Nguyen Thi Thuy Linh**

Metal-containing medicinal compound may contain either chemical elements essential to life forms or nonessential/ toxic elements that carry out specific medicinal purpose. Each medicinal compound or element will have a different response curve defining its limits of deficiency, optimal response or toxicity. This presentation aims of providing an overview, serving as a general reference the roles of metals in medicine.

 *End of Abstracts* 