Research and Industry Placement Enterprise (RIPE)

RIPE is a new internship program initiated by the Department, which is designed to facilitate our chemistry major students gain exposure in the working and business environment in industry and research institutes and establishing networks with various organizations.

The program is optional and students carry out job attachments of mutual interest between the student and the company concerned during the vacation periods of each academic year. This internship program does not award any modular credits to the students nor is one of the fulfilments towards their graduation requirements. Though we do strongly encourage the organizations to provide financial incentives to the students during the attachment, it is not a mandatory condition for participating in the program.

The program was inaugurated during the November – December 2006 vacation; the next cohort of students started their job stints during the May – July 2007 vacation. These students secured places in diverse organizations, such as the Bioprocessing Technology Institute, Health Sciences Authority, ST Aerospace Engines Pte Ltd, Shimadzu etc. We have received good feedback from the students on the opportunity to learn from and develop networking relationships with the organizations concerned and we hope to further leverage on the success of the program.

Organizations interested in providing placements for our students under this program are welcome to visit http://www.chemistry.nus.edu.sg/bulletin/ripe.html for more information.
In conjunction with the exhibition “China: 7000 Years of Innovation” at the Singapore Science Centre (see introduction next page), the Faculty of Science organized its annual Science Alumni Day on 23 June 2007. Alumni spent an interesting day at the exhibition immersing themselves in the journey of Chinese ancient science, after which they feasted on the reunion dinner and reconnected with friends. The Faculty also took the opportunity to present the annual Distinguished Science Alumni Awards and Outstanding Science Alumni Awards during the dinner. We are pleased to congratulate our Chemistry alumni, Dr Yip Soon Kwong John for being the sole recipient of the Distinguished Science Alumni Awards 2007 and Dr Chong Yoke Sim for being one of the awardees of the Outstanding Science Alumni Awards 2007 respectively.

Dr Yip Soon Kwong John

Distinguished Alumni Awards


Dr Yip served in various portfolios in the Education Service till his retirement in 1996. He has done extensive research in education policies and practices and co-authored two books on Reflections and Renewal in Education in Singapore. During his subsequent tenure in the Singapore Institute of Management, he played a major role in conceptualizing the Singapore Management University and the SIM University. Dr Yip is an Honorary Fellow of the Singapore National Institute of Chemistry and the Singapore Institute of Management. He was on the Board of a number of statutory and other organizations. He is especially proud of bringing to realization the Singapore International School in Hong Kong, which is among the top international schools in that region. Awards he has received include the Officier dans l’Ordre des Palmes Académiques from the French Government, an Honorary DSc by Loughborough University and an Honorary Doctorate from the Open University of the UK.

Dr Chong Yoke Sim

Outstanding Alumni Awards

BSc SU (1978), BSc Hons SU (1979), PhD NUS (1984), CEO, National Computer Systems (NCS)

Upon graduation from NUS, Dr Chong joined IBM Corporation, and subsequently Hitachi Data Systems. She left for National Computer Systems (NCS) in 1996, starting as General Manager for Business Development and progressing to assume the position of Chief Operating Officer and head of regional IT and communications engineering group, and finally Chief Executive Officer of NCS, leading a team of 3000 professionals in one of Singapore’s largest home grown information technology companies. Dr. Chong is the Vice-Chairman of the Singapore IT Federation (SITF) and the Chairman of the eGovernment Chapter of SITF. She also holds membership in the SICC IT Advisory and Committee. In addition, she is a member of the NUS School of IT Advisory Council, Ngee Ann Polytechnic School of IT Advisory Board and Chairman of Innova Junior College. She was recently appointed to the Women’s Leadership Board of the Kennedy School of Government, Harvard University.
The Faculty of Science is proud to be the exhibit sponsor of “China: 7000 Years of Innovation” being held in the Singapore Science Centre that showcases areas in which the Chinese played pioneering roles. Of particular mention is the Department’s Food Science & Technology Program contribution to the Traditional Chinese Medicine exhibits and public lecture on the topic. In all, apart from exhibitions, there will be live demonstrations, educational program and public talks etc for the members of the public. For details, please visit http://www.scienceexhibition.com.sg.

The Faculty of Science aims to channel 50 to 70 per cent of its students through some form of international exchange during their time in NUS. In support, the Faculty has launched the Science Students Overseas Exposure Fund (SSOEF) on 03 June 2006, with the aim to help deserving needy students with their travelling and living expenses when they spend one or two semesters overseas while getting their NUS degrees.

Since the launch of SSOEF, $279, 694 has been raised from 36 donors, of whom most are alumni. Our target for the fund is $500,000 in five years. To date, two students have received funding from the SSOEF to go to the University of New South Wales in Australia on a summer exchange program. In addition, a group of 20 students went to Cambodia to build schools under Project Angel organized by the NUS Students’ Science Club.

On 20 March 2007, a T. rex Footprint Path was unveiled at the entrance of the Faculty of Science Dean’s Office building to honour founding donors of the SSOEF.

NUS Chemistry will be celebrating the 80th Anniversary of Chemistry in Singapore in 2009. In line with this milestone, a range of activities is being planned. The celebrations will start in 2008 and end with a “bang” in 2009. Details will be announced in due course.

To kickstart the celebration, the design competition for the anniversary logo was held recently. The competition has attracted enthusiastic response. Judging is in progress and the winning entry will be announced soon.

In addition, an exclusive in-house publication team consisting of four undergraduate students (photos at left) was formed to produce an anniversary brochure that would highlight 80 of the numerous personalities who played a part in shaping the past 80 years of the Department and of Chemistry in Singapore on the whole. The team has been busy since May 2007, conducting interviews and working on design ideas for the brochure. The brochure is targeted for completion in August 2007.

Other activities are currently still in the planning stage and there will definitely be something in store for our alumni. Stay tuned with updates at http://www.chemistry.nus.edu.sg/events/80thAnniversary.html.
Reflection: My Route Towards Entrepreneurship

After two and a half years of graduate study in NUS Chemistry, I found a good job as a senior chemist in a pharmaceutical company. Complacent and working for two years, the company undergone a major restructuring and my job was taken away. At that time, fortunately, my supervisor Professor Wong recommended me to another job. But with this experience, I started to seriously thinking if I should be working for one company or another for the rest of my life.

I joint Agilent as a support specialist some years later. While this company is well known to provide good salary and very good working environment, the idea of eventually working on my own remained. Two of Professor Wong’s students - Olivia Lum (Honours, 1986; see ChemConnections Issue no. 1, Feb 2000) and Lan Weiguang (PhD, 1994; see ChemConnections Issue no. 8, Jul 2003), are very successful entrepreneurs. Therefore, I must admit that they have inspired me and provided strong encouragement to be like them.

I would say Olivia and Weiguang are risk-takers and they are most probably “born entrepreneurs”. They started working on their own from an early age. I am not a risk-taker and prefer to prepare carefully before taking the next important steps. So, I started off only after I had accumulated enough savings to support the operation of a business and to cover the spending of my family.

My first job as a chemist was mainly for pesticide residue analysis. Everyday my colleagues and I had to do tedious sample preparation work and were exposed to harmful solvents (in those days benzene was used for extraction). Since then I have wanted to integrate sample preparation with instrumental analysis. The dream has stayed with me for 20 years. To develop such solutions, people with both the skills in programming and electronics are needed. I tried to look for partners with such skills, unfortunately it was not successful.

These people normally do not want to give up their well-paid jobs and jump into a life full of uncertainties. After having failed several times in looking for the right partners, I decided to learn programming and electronics by myself. For two years, I used all my spare time in reading and practicing. It is tough for someone over 40 to learn programming from scratch. However, it is not a mission impossible. Finally, I was able to make my own control software and the control boards. I was even invited by a polytechnic to teach engineering students about Visual Basic programming and computer control. My website on programming and automation has become a popular tutorial source for engineering students.

(See www.easyautomation.ca)

In spite of all the careful preparation before starting up a company, there were still huge unexpected challenges. When my products were ready, people simply do not have confidence and would not try them. When I did make my first sale, the hidden cost actually took away all the profits. I have also wasted a lot of money and time because some of the business partners did not keep to their word. It was difficult, but my strong passion supported me through all these difficulties.

Now our company, PromoChrom Technologies, is two years old. Its valve-based clean-up station has begun to sell and is drawing interest from many chromatographers. We have built an effective and economical model for product manufacturing, application development, and product distribution. Many interesting products for chemical analysis are currently under development. Although it is still a long journey to see my dream come true, I am getting closer to the target everyday. It is the greatest reward to my work when I see more and more chemists benefit from our products.

I could perhaps share a few words with my NUS friends who are considering starting their own business. Firstly, you must be prepared for difficulties and hard work. In order to tolerate tough times, you certainly need a strong passion to motivate yourself and a good health to handle endless work. If my suggestions wouldn’t scare you away, then you should be the right person to work on your own.

Secondly, you may be hoping for help from your friends or government, but your work plan should only be based on your own resources and skills. The distant help, if it eventuates, can only be treated as a bonus.

Finally, once you have made the decision, hold on to it and be patient with the results. You may encounter many disappointments and make many mistakes. Do not give up. Good luck may just come after you have persisted that little bit longer.

ABOUT WAN HAI BIN ...

Hai Bin came to Singapore in 1992 to undertake graduate study under the supervision of Professors Wong Ming Keong and Mok Chup Yew. He worked on a research topic in the field of analytical and photochemistry. After graduation, Hai Bin worked for several companies until he finally set up his company PromoChrom Technologies in 2005. Here, he shares with us the steps he has taken towards setting up his own company.
Chemistry Honours Symposium 2007

The Department held its annual Chemistry Honours Symposium on 13 April 2007, during which our graduating Honours cohort presented their year-long research projects in the University Hall, National University of Singapore.

As part of the program, a day-long seminar was held that featured prominent overseas speakers – Prof Stuart Edelstein from the University of Geneva, Prof Steven Bernasek from Princeton University and Prof Timothy Swager from the Massachusetts Institute of Technology, in addition to Chemistry alumnus Ms Yong Hwee Yee from GlaxoSmithKline Pte Ltd and our own Dr Martin Lear from the Department.

In the evening, students and guests enjoyed a sumptuous dinner at the Kent Ridge Guild House. Several best poster awards were given out during the dinner to mark the efforts of the students, courtesy of the generous sponsorship of BASF, GlaxoSmithKline Pte Ltd and the German Institute of Science and Technology.

For more information about the Symposium, please visit http://www.chemistry.nus.edu.sg/events/honsym07/index.html.

Honours Graduation Ball 2007

On 12 May 2007, the Department organized the annual Honours Graduation Ball at the Grand Copthorne Waterfront Hotel, where the Honours students ate, drank and merried the night through with Chemistry staff, before they bade farewell to their undergraduate life. It was a boisterous event with good food, fun games and entertaining performances. In particular, the crowd was swooned by the professional Tango and Chacha dances exhibited by Honours student Lee Jingyi and her partner.
Singapore Chemical Science Fair

As part of our efforts to promote and support chemical science research project work in secondary and tertiary institutions in Singapore, the Department launched the Singapore Chemical Science Fair (SCSF) - a competition on research projects in specific areas in chemistry and the chemical sciences in 2006/2007. Schools began their proposed research projects from May 2006 and presented their posters on their findings on 10 March 2007. The students have put up a myriad of projects with creativity and a standard that impressed the international panel of judges. So difficult was the judging that a special mention award was set up at the last minute to recognize a good team that just missed out getting into the top three places. The eventual winners were Hwa Chong Institution for the Junior category and Jurong Junior College for the Senior category. The next Fair for 2007/2008 has already commenced (May 2007) with a new set of research themes. For more information about SCSF, please visit http://www.chemistry.nus.edu.sg/events/scsf2006-7.html.

Timothy Swager’s Public Lecture

The Department was proud to organize the public lecture “Polymer Electronics for Ultrasensitive Chemical and Biological Sensors” by Prof Timothy Swager from the Massachusetts Institute of Technology (MIT) on 14 April 2007. Prof Swager is a highly renowned figure in the global Chemistry arena, for both his pioneering research in materials/organic chemistry and portfolio as Head of Chemistry in the high-profile MIT. His innovative breakthroughs have been applied to the public and private sectors alike. There was a great turnout of about 200 for the public lecture. The audience, ranging from secondary school students to scientists, were given the chance to learn from Prof Swager through his very interesting and enriching talk.

Molecular and Nanoscale Metal Clusters Symposium

The Department ran the abovementioned Symposium on 10 May 2007. This dedicated event aimed to bring scientists together, providing an avenue for researchers to share research progress and interact on potential collaboration on the theme. Foreign speakers included Prof Richard Adams from the University of South Carolina, Dr Thomas Autrey from the Pacific Northwest National Laboratory, Prof Pierre Braunstein from Universite Louis Pasteur, Prof Bryan Eichhorn from the University of Maryland, Prof Atsushi Fukuoka from Hokkaido University and Prof Andrew Weller from the University of Bath. There was enthusiastic exchange among scientists who found the symposium very beneficial.
National Chemistry Week (NCW) 2007

The inaugural National Chemistry Week (16 – 24 June 2007) aimed to raise awareness of the importance of Chemistry as the central science by highlighting the applications of Chemistry in our daily lives. It consisted of a diverse series of outreach events organized by the Singapore National Institute of Chemistry, in partnership with the Department and several organizations. In particular, many of the activities, such as the following reported, were held in the Department. The Week was launched on 16 June 2007 at NUS, by A*STAR chairman Mr Lim Chuan Poh. The closing ceremony took place on 23 June 2007 at NUS, with Dr Lee Kum Tatt as the Guest of Honour.

A Snapshot of NCW events

Chemistry Fact or Fantasy Quiz

Chemistry Fact or Fantasy was a novel fun quiz that tested not only how much you knew about Chemistry, but also how much you did not! Each team comprised of three Secondary Three level participants, who were given a wireless control unit to answer their questions. The quiz master asked Chemistry-related questions in rapid fire speed and participants pressed a button to answer “true” or “false”. Organized by the Department, we had 18 teams participating. After three rounds of nail-biting competition, Maris Stella High School emerged as the winner.

Chemistry Communications Challenge

Chemistry Communications Challenge is a biennial event organized by the Department and Singapore National Institute of Chemistry. It aims to provide secondary school students a platform to explore new ideas and deeper understanding of significant topics in chemistry and their unlimited applications vital to Singapore’s industry, economy and society. The contest was first organized in the 1970s and this year, the 19th event of the series was held.

We were pleased to receive support from Ciba Specialty Chemicals and Degussa GmBH this year in both financial sponsorship and judging efforts. We had 29 teams participating in the English category and 18 teams in the Chinese category. Hwa Chong Institution and CHIJ St. Nicholas Girls’ School were declared champions for the English category and Chinese category respectively. The best speaker awards for both categories went to Nanyang Girls’ High School.

Lab Hands-on

Several companies conducted week-long hands-on sessions in laboratories of the Department for walk-in members of the public, such as the well-received BASF Kids’ Lab and Merck’s Magical reagents and Merck’s Food Science Adventure etc.

NUS Chemistry Camp

From 19 - 22 June 2007, the Department hosted a group of Secondary Three level students in its Chemistry Camp to explore the exciting world of chemistry. It was a four-day overnight programme with hands-on experience in laboratories, lectures and a variety of social events.

Magical Chemistry Demonstration

In conjunction with the Week, the Department gave demonstrations of simple chemistry experiments in primary and secondary schools. These experiments explained concepts of chemistry in fun and exciting ways. A session open to members of the public was also conducted in Suntec City.
Effective Hydrogen Storage

by Chen Ping

To address the concerns about global climate change, urban pollution, and energy security, scientists have been putting increasing efforts to change the current carbon-based energy system into a so-called hydrogen-based economy.

Hydrogen, the simplest and most abundant element in the universe, contains more energy on a weight-for-weight basis than any other substance; however, as the lightest element it also has very low-volume energy density.

Conventional options for hydrogen storage include the high-pressure hydrogen tank and the liquid hydrogen Dewar. However, both methods suffer significant energy penalties, i.e., 20% and 40% of stored energy, respectively. Scientists believe that chemically bonding hydrogen to lightweight elements, or solid-state hydrogen storage, holds the most promise.

In July 2003, the US Department of Energy (DOE) issued a Grand Challenge to the global scientific community for research and development in hydrogen storage. DOE has set targets that materials for on-board hydrogen-storage systems should have reversible 6 wt.% hydrogen-loading storage capacity by 2010 and 9 wt.% by 2015.

A team led by me at the National University of Singapore started the research on hydrogen storage materials in 1998. In 2001, we found by accident that lithium nitride (Li$_3$N) can reversibly store 10.5 wt.% of hydrogen at temperatures above 200°C according to the reaction (the equation is as below), the overall storage capacity is about 40% more than magnesium hydride, the best-known hydrogen storage material to date (please see Chart 1).

$$\text{Li}_3\text{N} + 2 \text{H}_2 \rightarrow \text{LiNH}_2 + 2 \text{LiH}$$

We published our finding on Metal-N-based hydrogen storage compounds in the top scientific journal Nature in 2002. As a consequence, national laboratories, industrial R&D centres, and universities worldwide have invested substantial effort into developing new Metal-N-H systems and understanding the mechanism of hydrogen storage.

In continuous efforts to exploit Metal-N-H systems, our team has discovered that substituting other elements for a part of the Li in the Li-N-H system could significantly modify the reaction thermodynamics; for example, when we partially substituted Li for Mg in the Li-N-H system, the dehydrogenation temperature shifted downwards to about 100°C. By introducing Al to the system, more than 6 wt.% of hydrogen can be released near ambient temperature.

Some of our work has been published in premiere scientific journals such as Advanced Materials and Advanced Functional Materials and we look forward to more exciting findings in the future.

About Chen Ping ...

Chen Ping obtained her B.Sc., M.Sc. and Ph.D. degrees from Xiamen University, China.

She joined NUS in 1997 as a postmaster fellow under the Department of Physics and subsequently progressed to senior research fellowship. In 2006, she became an Assistant Professor, jointly appointed by the Departments of Chemistry and Physics. Her recent accolades include the Temasek Young Investigator Award 2006 and NUS Young Researcher Award 2007. She currently sits on the International Advisory Board of the International Association for Hydrogen Energy and is one of the Principal Editors of the Journal of Materials Research.

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