In late 2011 the Ministry of Economic Development and Innovation asked Prof. Cynthia Goh to share her thoughts on innovation in their popular blog. Since fundamental science plays a significant role in many of the IOS resident companies, her post discusses the importance of strong science and engineering as the foundation for products and services that can significantly change the way we live. The post can be found here and is also copied below.

The power of fundamentals: The need for new models of science-based innovation

Common products and the fundamental science behind them:

1. MRI’s at a hospital are based on nuclear magnetic resonance, the discovery and development of which has resulted in two Nobel Prize’s in Physics in 1944 and 1952.
2. Modern high-speed telecommunications, including the internet, is based on fiber optic technologies and photonics research.
3. Magnetic high-density hard drives utilize properties developed by research in spintronics, a field created by the discovery of giant magnetoresistance of films in 1988.
4. Global Positioning Systems (GPS) require precise timekeeping provided by atomic clocks housed in a system of satellites orbiting the Earth.
5. The process of extracting insulin in order to treat diabetes was developed by Frederick Banting and Charles Best from an understanding of pancreatic physiology.
6. The creation of biosynthetic ‘human’ insulin was the first medication produced using recombinant DNA technology.
7. The development of chemical surfactants after World War II allowed the reformulation of Windex to be a non-flammable liquid that didn’t require metal packaging.
8. High-efficiency fluorescent lighting is a result of the understanding of light produced by gases and other molecules when excited by an electric current.
9. Lasers, the result of significant theoretical and experimental work in quantum mechanics and radiation, are the backbone of CD-readers, micro-machining/cutting, medical procedures, holography, and many chemical and physical analysis techniques.
10. Microphones and musical instrument pick-ups rely on special piezoelectric materials, which convert a mechanical signal (the vibration of the instrument) into an electrical one that can be fed into a receiver.

At about this time of year, 25 years ago, Canadian chemistry was at the top of the world: John C. Polanyi, Professor at the University of Toronto, was awarded the Nobel Prize in Chemistry (together with two Americans), recognizing the important fundamental discoveries he made elucidating the workings of chemical reactions. This year was declared the International Year of Chemistry, and Canada Post recently issued a stamp honoring John Polanyi and his work. We Canadians have good reason to be proud of our scientific excellence. Since 1923, twelve Canadians have been awarded the Nobel Prize in recognition for their accomplishments in everything from the development of insulin to DNA telomers. We have also played a vital role in the development of stem cells, photonics, and many other areas of fundamental science that push the boundaries of our knowledge.

Canadian universities are not only highly rated and celebrated in their research accomplishments, but also in educating our citizens. The so-called ‘research university’ is characterized by employing teachers who are expert practitioners. These individuals teach not because they read the book on the subject, but because they wrote the book on the subject. Training provided by such experts constitutes a substantial contribution to society, and the
graduates of our universities are comparable to those of leading institutions worldwide. But I will argue that we can do much more – that the knowledge generated as a result of fundamental research needs to be more efficiently transferred to society at large. New or improved paradigms, services, and products are vital to improving the lives of all Canadians and the knowledge generated within a university has a key role to play in these developments. If we want to efficiently create new companies and jobs, improve our workforce productivity, and create a more inclusive society then we need to envision a new model for the interaction between universities, society, and industry.

The road from research lab to a product is usually characterized as a series of unlikely events where an individual who makes a discovery is usually not the one who sees its social and commercial potential. We need to facilitate this process by educating students and faculty members to consider how their work on fundamental problems can help create the next disruptive technology. Many graduate students in the sciences and engineering are finding themselves without faculty positions after years of research experience and teaching them how to apply their knowledge to address a need within a commercial market presents massive potential for invigorating the economy.

Many people do not know the effect that fundamental science has had on the products and services that they use everyday. From medical devices like MRI and ultrasound, telecommunications and smartphones, microwaves, cameras, laser printing, and non-stick pans, none of these would be possible without a fundamental understanding of the optics, chemistry, or physics behind them. Canada has played an important role in developing this knowledge, but falls short in capturing the value of these discoveries. What we need is to develop and support new models for how to ignite the ideas, ingenuity, and passions of researchers to create value for society at large.

Prof. Aephraim Steinberg awarded top breakthrough of the year by Physics World

2012 January 2 by smcauley

This past year Prof Steinberg led an international team of researchers in applying a modern measurement technique to the historical two-slit interferometer experiment and successfully accomplish what the physics textbooks said was impossible. They succeeded in experimentally reconstructing full trajectories, which provide a description of how light particles move through the two slits and form an interference pattern. Their description of the experiment was published in Science and resulted in coverage by the world’s science media, including a feature in Physics World.

For more information check out this article in U of T News or read the journal article.

Lumentra receives OCE Technical Problem Solving grant

2011 December 2 by smcauley

Lumentra Inc is embarking on a new collaborative project with the Centre for Advanced Coating Technologies at the University of Toronto with the support of a Technical Problem Solving grant from the Ontario Centres of Excellence. Designed to support short-term projects between industry and academic, Technical Problem Solving projects focus on quickly applying research and technical expertise to solving industry-identified problems to spell innovative products and services to market.
IOS awards inaugural Innovation Fellowships

2011 December 2 by smcauley

Last night at the final TechnoClub meeting of 2011 the IOS announced its inaugural round of Innovation Fellowships as part of its entrepreneurship education program. Awarded to individuals within companies housed in the IOS, the Fellowships are valued at $5000 and can be put towards a variety of expenses such as legal fees, equipment, or salaries. Each of the companies have participated in the summer Techno course and are working to develop and commercialize their technologies.

Awardees
Kinetica Dynamics
Breq Labs
Lunanos
Insight Nanofluidics
Ecoatra
Sense Intelligent
Pueblo Science
Luminautics
Sciventions

IOS Field Trip to Walkerton

2011 November 23 by hkim

On Monday, November 21, a group of companies from Techno, the IOS hands-on entrepreneurship training program, had a very productive visit to the Walkerton Clean Water Centre www.wcwc.ca. We would like to thank the WCWC for hosting our visit, and giving us a very informative orientation to the various techniques and equipment used in drinking water systems. The facility and staff earned rave comments from everyone, especially the ability to test new equipment in a real water-cleaning plant. We look forward to collaborations in the future.
Vive Nano Nominated for a 2011 Agrow Award

2011 October 27 by smcauley

Agrow, the world’s leading information provider for the global crop protection industry, has announced the shortlist for the 2011 Agrow Awards (www.agrowawards.com/shortlist2011), and Vive Nano has been nominated for the Best Formulation Innovation. The award recognizes the most significant innovation in the formulation of agrochemical or biopesticide products: innovations that could lead to improved product efficacy, improved user safety, or reduced environmental impact. The other two nominees are DuPont Crop Protection and Huntsman Petrochemical/Fuzion Technologies.

This year’s event will be held on November 1st at London’s Marriott Grosvenor Square, where the most accomplished and knowledgeable people in the industry will pay tribute to their peers at the industry’s most prestigious and hotly-contested awards event.

“Over the past few months, our panel of judges has reviewed all the entries to produce a shortlist that displays the wealth of innovation, dedication and hard work that both groups and individuals in the global crop protection industry have demonstrated over the past year,” explains Sanjiv Rana, Editor-in-Chief of Agrow.

“As is evident from the shortlist, there is a broad diversity within the applications. Companies and institutions of different sizes and geographical locations are pitted against each other.” explains Sanjiv.

The 2011 Agrow Awards features 14 categories that reward innovation and excellence in areas as diverse as product chemistry and technology, business strategy, and corporate responsibility.

Vive Nano was founded out of the Department of Chemistry and the Institute for Optical Sciences at the University of Toronto in 2006 by Prof. M. Cynthia Goh, (current member of the Scientific Advisory Board) and co-developers of the company’s technology, Dr. Darren Anderson, Dr. Jordan Dinglasan, Dr. Jane Goh, Dr. Richard Loo and Dr. Gwynn
Curran-Sills. Vive Nano specializes in encapsulation, using innovative materials to find simple small answers to big issues, with a focus on developing new formulations for the Crop Protection industry. Vive Nano’s disruptive technology leverages green chemistry: with the primary inputs being bio-inert polymers, water, and electricity. Vive Nano has been recognized as one of Canada’s Top 10 Cleantech Companies, as one of Canada’s Green 15™ leading green technology companies by Deloitte, and by Canadian Business magazine as the winner of Canada’s Clean15 competition. The company also received the 2010 Frost and Sullivan North American Technology of the Year Award for its nanotechnology encapsulation. The Company has received notable support from Sustainable Development Technology Canada (SDTC) and the Government of Ontario’s Innovation Demonstration Fund (IDF). For further information see www.vivenano.com.

Michael Montgomery Wins Innovation Challenge Award

2011 October 20 by smcauley

On Monday October 17th, MITACS Commercialization & IOS Innovation Fellow Michael Montgomery was awarded the NSERC Innovation Challenge Award for his research on vibrational dampening in high-rise buildings.

Tall buildings will naturally sway throughout the day because of wind or because of movements in the earth. These subtle movements are less perceptible when you are close to the ground. However, taller buildings amplify these movements. For people occupying higher floors, motion sickness is a serious problem unless a damping device is deployed to control the building’s swaying. This becomes all the more important in the event of an earthquake, which can cause damage to structures.

Previous efforts to dampen sway have consisted of making a building as heavy as possible or as rigid as possible. However, both of these approaches reduce the amount of usable space available in the building and add significantly to its construction costs, and both solutions do not prevent damage to buildings caused by earthquakes.

The award is given for research with potential commercial applications, and Michael and his supervisor/co-founder Professor Constantin Christopoulos have started Kinetica Dynamics to transform the technology into a product.

“It is a considerable new challenge,” Montgomery says about starting a new company. “I am not just the researcher anymore, but I am now also a salesman, a marketer, an accountant, of course, an engineer. There are a lot of new skills I am developing,” he adds.

“I certainly feel encouraged by receiving this award, but now the hard work begins, convincing industry insiders the merits of the technology and hopefully incorporating this in some of the most ambitious projects in the world,” he states.

Learn more about Kinetica Dynamics

Other featured articles:

Honouring Young Canadian Researchers who Translate Discoveries into Real World Applications

Recent Civil Grad Converts PhD Research Into Company
DVS visit of Xiang Zhang in November

2011 October 17 by hkim

Quick off the heels of our September DVS series, we are thrilled to have Prof. Xiang Zhang from UC Berkely visiting us in November. His talks will cover a range of insights into creating new photonic metamaterials and will take place November 2nd, 3rd, and 4th, at 2:00pm. Look out for more information at http://www.optics.utoronto.ca/academic/dvs/zhang.

Canada Post unveils stamp of IOS faculty member John Polanyi

2011 September 29 by smcauley

As part of the City of Toronto's Nuit Blanche celebration on October 1st, Canada Post is releasing a limited edition stamp in honour of Nobel Laureate, IOS faculty member, and University of Toronto professor, John Polanyi. Polanyi is one of three winners of the 1986 Nobel Prize in Chemistry in recognition of the development of the new field of reaction dynamics and was cited for his pioneering work in developing the method of infrared chemiluminescence.

The stamp was designed by Tejashri Kapure and features a photograph of the chemist and a design that represents his laboratory’s ongoing work in Scanning Tunneling Microscopy. Polanyi’s stamp will be unveiled Saturday, Oct. 1 at 8 p.m. outside Sidney Smith Hall, 100 St. George Street, as part of the Department of Chemistry’s Nuit Blanche festivities and ongoing celebration of the International Year of Chemistry (2011).

Volunteer Position: SR U of T Festival Director

2011 September 29 by hkim

We are looking for a motivated student who loves science and technology, and would like the public to also understand science and the people who do it.

Science Rendezvous (SR) is an all-day science festival where researchers, professors and their students interact with the public. The entire University of Toronto’s St. George campus comes alive to showcase our innovative research as well as entertain and educate attendees of all ages on a variety of aspects of science.

The Institute for Optical Science is looking for a Science Rendezvous U of T Festival Director, to be the main organizer of the events. The person should be self-motivated, resourceful and well organized.

The primary responsibility of the Festival Director is to ensure that SR at U of T is successful by putting together an
appealing festival program, with help from the individual departments which will show-case their science, and the nationwide Science Rendezvous organization. Recruiting passionate and talented individuals to oversee some of the activities is a key priority. Also, developing new and creative activities, and promoting the entire event to the public will be important.

The Director will oversee all financial details, such as developing economic and budgetary strategies, scheduling specific fundraising events, and applying for grants. The Director must also be able to work with the advisory board.

Finally, the Director must possess excellent organizational and interpersonal skills since the position will involve a significant amount of multi-tasking, delegating responsibilities and inspiring volunteers.

This is a unique opportunity for the successful candidate to take the science out of the labs, and make it accessible to the public, and also to earn experience managing a large-scale activities, combining aspects of science, education and management.

Please see www.sciencerendezvous.ca for details on the previous years’ events.

The next Science Rendezvous is on Saturday, May 12, 2012.

Application deadline: Tuesday, October 18, 2011

Please send in your coverletter and resume to ios@optics.utoronto.ca.

« Older Enteries Newer Enteries »