photonics

Canadian partnership efforts make light work

Producing scientific innovations in labs is one thing. Putting them to work in commercial applications is another. Fortunately, when it comes to Canada's interest in photonics, robust networks bring together resources that translate world-class research into competitive technology and products.

Yet Canadian photonics applications reach beyond 'high tech' into almost every sector of the economy. "Photonics technology providers in Canada employ about 20,000 people and generate about $4.5 billion dollars in revenue. If you include the users of the technology, you have to multiply those numbers by about 10," says Dr. Sylvain Charbonneau, director of Applications Technologies – National Research Council Canada Institute for Microstructural Sciences in Ottawa.

Over the last five years, photonics applications have diversified from a stronghold in the telecom sector into fields including environmental studies, and the oil and gas and biomedical industries, says Dr. Charbonneau, noting, "Every car manufacturer worldwide uses high-powered lasers for cutting metal."

The NRC IMS – renowned for optical materials and devices research – holds a portfolio of 100 patents, most in photonics technologies. The institute also directs the Canadian Photonics Fabrication Centre (CPFC), which works with companies, government laboratories and academic researchers to prototype and produce photonic devices.

Another cornerstone of the Canadian photonics network is CMC Microsystems. Its products and services include microelectronics, micromechanics, microfluidics, photonics/optoelectronics and embedded software.

"When combined with microelectronics and other technologies, photonics leads to even greater value," says Dan Gale vice president and CTO of CMC Microsystems.

At the University of Toronto, for example, Dr. Amr Helmy, Professor of Electrical and Computer Engineering, is developing a new class of integrated optoelectronic chips – more mobile, rugged and compact than chips used in the semiconductor industry today. Their potential applications range from medical diagnostic devices, environmental sensing systems and communications equipment to consumer electronic products and forensic testing and analysis devices.

Through a partnership with CMC and CPFC, Dr. Helmy was able to manufacture and test sophisticated photonic components.

Other achievements in CMC's partnership pipeline include OneChip Photonics, which recently received $19.5 million in venture capital funding to produce optical transceivers with the potential to transcend current bandwidth and cost barriers. Other products created through CMC partnerships include a long-range surveillance system that makes it possible to read a licence plate from two kilometres away, and an electronic 'nose' capable of sensing minute amounts of toxic chemicals, and 'eyes' that will go into space on the next generation of the Canadarm.

Canada's photonics network provides support and funding to move technology out of the university and into the market, says Professor Paul Corkum, one of the world's leading experts on lasers, and the program leader of the NRC's Atomic, Molecular and Optical Science Group. He says the network provides Canada with a unique edge, one that helps concentrate expertise in an area of significant market potential.

"Scientific research is, by its nature, collaborative, and Canada is a popular destination with foreign PhD students and postdoctoral fellows. This is a big advantage for Canada." he says, adding the photonics network bridges a traditional gap between university researchers interested in concepts that have never been studied before and companies trying to develop products that haven't been developed before. "These (network) organizations bring these two diverse cultures together as much as possible."

Organizations such as Le Réseau Photonique du Québec and the Ontario Photonics Industry Network also help support the industry through workshops and networking nationally and internationally. At the epicentre, the Canadian Photonics Consortium helps unite efforts among organizations and networks.

"The strength of pulling together all these networks is incredible as it enables relationships to happen through the whole system, not only academic-industry but also industry to industry and industry to end customer," says Don Wilford, managing director of the Centre for Photonics at Ontario Centres of Excellence. ■

Industry Leadership

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Today, WDI has grown into the leader in the LCD market and is expanding into semiconductor, biotech, solar panels and general Automated Optical Inspection.

Responding to customer demand, WDI has since expanded its focus and now offers a range of industrial microscopes and sensors through agents and OEM partners in Korea, Japan, Taiwan, China, the United States and Europe.

WDI's vision is to continue to focus on developing unique, leading-edge components for growth industries.

For more information, visit www.wdidevice.com.

Adapted from Making Light Work for Canada, a report published by the Canadian Photonics Consortium.