The IEEE Ottawa Antennas and Propagation Society and Microwave Theory & Techniques Society (AP/MTT) Joint Chapter, Broadcast Technology Society, and Consumer Electronics Society (ComSoc/BTS/CES) Joint Chapter, Electromagnetic Compatibility (EMC) Chapter, IEEE Photonics Society Ottawa Chapter (LEOS), Communications Society, IEEE Ottawa Section (OS), and National Research Council (NRC) are inviting all interested IEEE members and other engineers, technologists, and students to the IEEE Ottawa Seminar.

TIME: 2:00 pm – 4:00 pm.
IEEE Ottawa Seminar: 2:00 pm – 3:30 pm.
Questions, Discussion, Refreshments, and Networking: 3:30 pm – 4:00 pm.
ADMISSION: Free. Registration required because NRC needs an attendee list. Please use the Eventbrite website [http://www.eventbrite.ca/event/6501234367/](http://www.eventbrite.ca/event/6501234367/) to register this event by Sunday May 5. A registrant list will be downloaded from Eventbrite and sent to NRC at the end of Sunday May 5.
If you have any question about registration and seminar, please contact Dr. Qingsheng Zeng (qingsheng.zeng@crc.gc.ca)

High performance terahertz devices for communication and imaging applications
by
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Abstract
Terahertz (THz) technologies aim to address the largely underdeveloped and almost unexploited electromagnetic spectral range between 1 and 10 THz (10^{12} – 10^{13} Hz), which lies between visible/infrared optical bands and radio-frequency (RF)/microwave frequencies. With a much higher carrier frequency than RF/microwave, the unlicensed terahertz band holds great potential for next generation high-speed wireless communications, such as secured short-link communications, local access network connections, and high-speed wireless communications. Terahertz radiation could also be used for other important applications, such as THz spectroscopy, atmospheric pollution monitoring, global warming, medical and biological research, THz imaging for detecting concealed weapons or currency forgeries at airports or security check points as well as THz Radar for spotting roadside bombs over a short distance. Despite these identified and wide-ranging applications, deployment of THz technologies has largely fallen behind that of electromagnetic technologies at optical (visible/infrared) and RF/microwave frequencies. Progress towards viable THz applications has been hampered by the lack of suitable and enabling components, such as emitters and detectors. In this talk, I will present novel THz devices – THz quantum cascade lasers (QCLs) [1] and THz quantum-well photodetectors (QWP) – which are based on intersubband transition in semiconductor quantum structures for wave generation and detection, respectively. In collaboration with the National Research Council (NRC), we employed a combined theoretical and experimental approach, including numerical simulations based on a simple density matrix model and state-of-the-art molecular beam epitaxy growth and device fabrication, and demonstrated a new world record of the maximum lasing temperature of 199.5 K for THz QCLs in 2012 [2]. I will also report our other recent research progress, including the oscillator strength effects on THz QCL device performance, the many-body effects in THz QWP, and new active region design based on phonon-photon-phonon relaxation for THz.


Speaker’s Bio

Dayan Ban received B.S. and M.S. degrees, both in physics, from the University of Science and Technology of China, Hefei, China, in 1993 and 1995 respectively, and a Ph.D. degree in electrical and computer engineering from the University of Toronto in 2003. During 2001-2002, he was a visiting scientist at Nortel Networks Optical Components, Ottawa, Ontario. After being with the Institute for Microstructural Sciences of the National Research Council for three years, he joined the faculty of the University of Waterloo in November 2005, where he is now an associate professor in the Department of Electrical and Computer Engineering and the associate director for nanotechnology engineering program. He stayed at MIT eight months in 2009 for his sabbatical leave. He has authored and co-authored more than 120 refereed publications and 4 US/Canadian patents. His research interests include quantum optoelectronic devices, scanning probe microscopy, nanofabrication, infrared LEDs, photodetectors and up-converters, fiber Bragg grating sensors, and Terahertz quantum cascade lasers.