Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: **Thursday, 16 January 2020**

Time: **1:30 p.m.**

Location: **Physics & Astronomy Seminar Room 100**

Dr. Mustafa Yavuz

Department of Mechanical & Mechatronics Engineering
University of Waterloo

"Manufacturing, functionalization and packaging Nano and Micro-Electro-Mechanical-Systems (NMEMS) Sensors for "Fit and Forget" type self-powered autonomous systems"

ABSTRACT

Nano and Micro-Electro-Mechanical Systems (N/MEMS) devices such as smart sensors through a combination of optical and micro- and nano-system technologies are revolutionizing low power-high bandwidth electronics. These devices are the building blocks for a vast range of applications, from detecting cancer to wireless/wearable communications devices, monitoring energy use (electricity and gas) in vehicles and indoor climatic conditions for volatile organic compounds (VOCs) sensing.

While low power and high bandwidth devices through integration of autonomous and embedded sensors will soon number in the tens of billions, Canadian industry is challenged with conflicting objectives for developing the next generation of multi-functional sensor systems that are smaller, self-powered, less costly and reliable. For example, the detailed function of a sensor in the NMEMS chip is critical to the design of the package, and cost effective packaging and robust reliability are two critical factors for successful commercialization of NMEMS devices.

The NSF and DARPA of the US have selected autonomous and embedded MEMS sensors as a research focal point and increased supportive funding dramatically. Similar investments have been made in Europe and Asia, causing the manufacturing of NMEMS sensors to become a substantial part of advanced manufacturing technologies. To stay competitive in these technologies, Canada must make a comparable investment. The total global revenue for N/MEMS including sensors is predicted to increase exponentially and exceed US$102 billion by 2022 (www.zionmarketresearch.com).

HOST: G. Fanchini