



Western

Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: Thursday, 30 September 2021

Time: 1:30 p.m.

via Zoom: <https://westernuniversity.zoom.us/j/99891061366?pwd=TIpSNEMyKzhjZUNtUzNsSDc1ekxkQT09>

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“Ion beams for Si photonics and beyond”

ABSTRACT

We live in an era of continuous transition from electronic to optoelectronic and optical devices. Silicon dominated microelectronics, and now photonics offers great benefits in cost, performance and power consumption. Today, integration of Si photonics is challenged by compound semiconductors and Si microelectronics, the latter based on complementary metal-oxide-semiconductor (CMOS) fabrication, mostly due to the problems associated with making Si a sufficient light emitter, and thus realizing a laser. Light emission from Si and Ge quantum structures has been a focus of research due to the need to silicon-based light sources in optoelectronic and photonic applications. In this talk I would also like to give examples how ion beams can be used as a flexible “synthetic” tool to modify materials, from doping solar cells, to making light-emitting devices. There is a relationship between the preparation method of Si and Ge quantum structures, and the structural, electronic, and optical properties in terms of strength of quantum confinement (QC). We compare Si QDs prepared in silicon oxide and silicon nitride and discuss their potentials for application in light emitting devices. Since ion beam analysis is also a powerful characterization toolset, we focus on development of in-situ capabilities where electrochemical cell can be placed in ultra-high vacuum (UHV) and composition of the layers can be examined during growth process. Progress and challenges of in-situ analysis will be discussed.

Host: Prof. G. Fanchini