SEMINAR NOTICE

Department of Physics and Engineering Physics University of Saskatchewan

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SPEAKER: Joel Moreno, PhD Candidate
Physics & Engineering Physics

TOPIC*:* ***Experimental Characterization of an Inductively-Coupled plasma Immersion Ion Implantation System***

DATE: Tuesday March 29th, 2022

TIME: 3:30-4:30 p.m.

PLACE: ***Physics 103***

ABSTRACT:

Plasma immersion ion implantation (PIII) is a materials processing technology used for etching, implantation and deposition. It offers several advantages over conventional beamline ion implantation (CBII), including a simplified design, expedited throughput, and the ability to uniformly process large and/or irregularly shaped 3D objects. However, widespread adoption of PIII in industrial plants has been slow largely due to its novelty and inherent costs in transitioning production methods. In order to reap the benefits that PIII offers, certain design flaws must be resolved for it to become more economically advantageous.

PIII fixes a target material to a negative polarity high voltage (NPHV) pulsing stand and immerses both in the plasma, thus allowing independent control of incident ion impact energy and flux on the target. However, in doing so, simplifying assumptions about the implantation and deposition process are violated, making it difficult to obtain accurate predictions of the dose and depth achieved during this process. A series of experimental campaigns with the inductively coupled plasma (ICP) chamber at the University of Saskatchewan Plasma Physics Laboratory is underway to characterize plasma behaviour during surface modification from NPHV pulses. The first campaign used two Langmuir probes to measure perturbations that propagate away from the pulsing stand and disrupt the bulk plasma. The second, ongoing campaign involves building a laser-induced fluorescence (LIF) diagnostic system to provide spatially-resolved measurements of ion temperature and velocity as they are accelerated into the target. This data will allow a better understanding of the ion dynamics during NPHV pulses and enable more accurate predictive models of PIII processing, thereby making it more efficient and ultimately more competitive for large scale, industrial materials processing