Contribution ID: **1358** Type: **Invited Speaker / Conférencier invité**

Paths for High-Efficiency Low-Cost Photovoltaics

Wednesday 15 June 2016 08:30 (30 minutes)

Over the last couple of decades, the field of photovoltaics has experienced dramatic advances both scientifically and technologically. Critical elements playing into these advances have been the development of novel solar materials, innovative light trapping approaches, and innovative device integrations and enhancements. This talk will provide an introductory overview of the advances in incumbent technologies of silicon and III-V multijunction crystalline semiconductors as well as highlight the nascent and rapidly progressing perovskite solar cells –considering that the focus of all technologies is to continuously advance both high-efficiency and low-cost.

Thereafter, the talk will speak to molding the flow of light and passivation as critical aspects to the attainment of high-efficiency solar cells, and in particular with regard to thin Si solar cells. Photonic crystals, periodic nanostructures that exhibit optical bandgaps and various propagation modes, provide an opportunity for control over reflection, transmission and trapping of light in a given device construct. Potential paths for photonic crystal integration in silicon solar cells will be discussed. Specifically, successful integration of recently developed selectively transparent and conducting photonic crystal as an intermediate reflector in a multi-junction thin film silicon photovoltaic cell will be presented. Further, possible patterning of silicon into a photonic crystal absorber itself will be considered. In this context, the importance of surface passivation will be highlighted and in particular recent development of low temperature optically transparent passivation material and their integration in silicon devices will be given.

Author: Prof. KHERANI, Nazir P. (University of Toronto)

Presenter: Prof. KHERANI, Nazir P. (University of Toronto)

Session Classification: W1-5 Solar Energy Materials and Solar Cells (DCMMP-DAMOPC) / Matériaux pour l'énergie solaire et piles solaires (DPMCM-DPAMPC)

Track Classification: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)