

# The Waterloo Institute for Nanotechnology

## Seminar Series

### Dr. Henryk Turski

Institute of High Pressure Physics Polish Academy of Sciences “UNIPRESS” in Warsaw, Poland

## New Concepts In Nitride Light Emitters

Group III-Nitride semiconductor quantum heterostructures have revolutionized efficient visible light emitters. Even though nitride light emitting diodes (LEDs) and laser diodes (LDs) are now commercially mature, there are still new concepts emerging that can span their application even further. Our research focuses on using plasma-assisted molecular beam epitaxy (PAMBE) as a tool to realize novel approaches to nitride-based light emitters. By using PAMBE one can easily combine LEDs and LDs with tunnel junctions (TJs), what opens completely new class of devices. TJs lift off a traditional problem with poor p-type nitride layers conductivity allowing in the same time for easy vertical device stacking. Thanks to good current spreading devices do not need to be completely covered by metal contact and its surface can be functionalize. Light emitters utilizing TJ can be used as multi-color micro- or even nano-LED matrices or in electrically driven single photon detectors.

In this talk some recent results of PAMBE-grown laser diode and light emitting diode structures integrated with TJ will be shown.



**Dr. Henryk Turski** works at Institute of High Pressure Physics Polish Academy of Sciences “UNIPRESS” in Warsaw, Poland. Were in 2015 he defended his PhD thesis on growth of Nitride laser diodes by plasma-assisted molecular beam epitaxy (PAMBE). In 2016-2017 Henryk took a Postdoc position at Prof. Debdeep Jena’s and Prof. Huili Xing’s group at Cornell University in Ithaca, NY. During that time he was developing nitride-based tunnel junctions for applications in optoelectronic and

electronic devices. At Institute of High Pressure Physics Polish Academy of Sciences Henryk leads projects on long wavelength laser diodes and on using tunnel junction to invert effective built-in polarization in Nitride devices. In 2018 he was awarded with scholarship for outstanding young scientists by Polish Minister of Science and Higher education.

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