

Education

Ph.D. Physics (2004 - 2010)

Department of Physics and Applied Physics
University of Massachusetts Lowell

Thesis: *Frequency stabilization, tuning, and spatial mode control of terahertz quantum cascade lasers for coherent transceiver applications.*

M. Sc., Physics (2004 - 2009)

Department of Physics and Applied Physics
University of Massachusetts Lowell

Diploma of Specialist in Physics with honor (equivalent to M. Sc. degree) (1990 – 1996)

Department of Physics and Technology
Kharkov State University, Ukraine

Thesis: *Research of Optical and Laser Properties of Ticor ($Al_2O_3:Ti$) Single Crystals Grown in Carbonic Medium.*

Work Experience

Postdoctoral Researcher (2010 - present)

Submillimeter-Wave Technology Laboratory (STL)
Department of Physics and Applied Physics
University of Massachusetts Lowell

- Tested new low noise planar Schottky diodes for use in radio astronomy.
- Studied spectral and amplitude behavior of THz QCLs operating in pulsed and CW mode at liquid and solid nitrogen temperatures.
- Supervised undergraduate students and assisted in their training.
- Wrote data analysis and data collection programs in LabView.
- Wrote papers to be published in scientific journals and presented papers at meetings.

Research Assistant (2004 – 2010)

Submillimeter-Wave Technology Laboratory (STL)
Department of Physics and Applied Physics
University of Massachusetts Lowell

Development of novel THz quantum cascade laser (QCL) technologies:

- Developed the first 2.4 THz coherent transceiver where a frequency stabilized THz quantum cascade laser (QCL) was implemented as a transmitter and a CO₂ pumped FIR gas laser as a local oscillator.
 - Generated 2.4 THz stand-off inverse synthetic aperture radar (ISAR) images of targets using a QCL-based 2.4 THz transceiver.
- Developed the method to stabilize frequency of a THz QCL.
- Developed the first widely tunable sideband generator based on mixing a THz QCL with a microwave signal in a Schottky diode.
 - Applied new THz QCL-based tunable sideband generator in a gas spectroscopy.
- Developed the method for transforming THz QCL multimode beam into a Gaussian beam using hollow cylindrical dielectric waveguides.
- Studied spectral behavior of a THz QCL operating in pulsed and CW mode.
- Experienced in testing and obtaining electrical and optical characteristics of THz QCLs.

THz materials characterization for STL's Materials Research Program:

- Responsible for acquisition and interpretation of data obtained using millimeter-wave/submillimeter-wave/infrared FT-IR spectrometer, free-space millimeter-wave systems based on backward wave oscillators (BWO), and CO₂ pumped gas FIR lasers.
- Skilled in work with different THz sources (BWO, gas FIR laser, Gunn diode, quantum cascade laser) and different detectors and powermeters (bolometer, photodetector, Schottky diode, photo-acoustic powermeter, and pyroelectric detector).
- Skilled in work with microwave electronics.

Engineer

(1998 – 2004)

STC "Institute for Single Crystals"
National Academy of Science of Ukraine, Kharkov

Produced high optical and mechanical quality sapphire (Al₂O₃) single crystals with different crystallographic orientations by horizontally directed crystallization method (HDCM) in carbon-containing medium.

- Skilled in controlling the process of single crystal growth.
- Fully responsible for three single crystal growth machines: operation, maintenance, and upgrade.
- Participate in research of an influence of technological parameters such as a crystal growth velocity, composition of a medium, quality of a raw material, etc. on the properties of Al₂O₃ single crystals.
- Familiar with the processes of raw material purification and annealing of single crystals.

Research Fellow

(1995 – 1996)

STC "Institute for Single Crystals"
National Academy of Science of Ukraine, Kharkov

- Experienced in the growth of Al₂O₃: Ti (tikor) single crystals by Czochralski method (Tikor material is used in laser production).
- Skilled in measuring optical and laser characteristics of tikor single crystals.
- Familiar with annealing of Al₂O₃: Ti material.

Teaching Experience

Adjunct Professor

(2010-present)

Department of Physics and Applied Physics
University of Massachusetts Lowell

- Taught the graduate level course "Classical Mechanics" (95.611) Spring 2012
- Taught the undergraduate level course "Classical Mechanics" (95.513) Fall 2011
- Substituted for a professor to teach 4 lectures of the graduate level class
- "Electromagnetic Theory II" (95.657.201) Spring 2011
- Substituted for a number of professors to teach freshman Physics recitation courses Fall 2010, Spring 2011

Teaching Assistant

(2004)

Department of Physics and Applied Physics
University of Massachusetts Lowell

- Graded homework and exams for the graduate level class "Lasers and Applications" Spring 2005
- Taught two undergraduate laboratory sections of Physics I (96.141) Spring 2004
- Graded undergraduate level exams, homework Spring 2004

Awards and Honors

2008 Outstanding Graduate Student

2005 Outstanding First-Year Graduate Student

Department of Physics and Applied Physics
University of Massachusetts Lowell

References

Publications

1. **“Long-term frequency stability of a solid-nitrogen-cooled, continuous wave, free running THz quantum cascade laser,”** Andriy A. Danylov, Jerry Waldman, Alexander R. Light, Thomas M. Goyette, Robert H. Giles, Xifeng Qian, Neelima Chandrayan, William D. Goodhue, and William E. Nixon, (in preparation).
2. **“Terahertz inverse synthetic aperture radar (ISAR) imaging with a quantum cascade laser transmitter,”** Andriy A. Danylov, Thomas M. Goyette, Jerry Waldman, Michael J. Coulombe, Andrew J. Gatesman, Robert H. Giles, Xifeng Qian, Neelima Chandrayan, Shivashankar Vangala, Krongtip Termkoa, William D. Goodhue, and William E. Nixon, *Optics Express* 18, 16264-16272 (2010).
3. **“Frequency stabilization of a single mode terahertz quantum cascade laser to the kilohertz level,”** Andriy A. Danylov, Thomas M. Goyette, Jerry Waldman, Michael J. Coulombe, Andrew J. Gatesman, Robert H. Giles, William D. Goodhue, Xifeng Qian, and William E. Nixon, *Optics Express*, Vol. 17, Issue. 9, 7525-7532 (2009).
4. **“Terahertz sideband-tuned quantum cascade laser radiation,”** Andriy A. Danylov, J. Waldman, T. M. Goyette, A. J. Gatesman, R. H. Giles, J. Li, W. D. Goodhue, K. J. Linden, and W. E. Nixon, *Optics Express* 16, 5171-5180 (2008).
5. **“Transformation of the multimode terahertz quantum cascade laser beam into a Gaussian, using a hollow dielectric waveguide,”** Andriy A. Danylov, Jerry Waldman, Thomas M. Goyette, Andrew J. Gatesman, Robert H. Giles, Kurt J. Linden, William R. Neal, William E. Nixon, Michael C. Wanke, John L. Reno, *Applied Optics*, Volume 46, Issue 22, pp. 5051-5055 (2007).

Proceeding publications and presentations

1. “Long-term frequency and amplitude stability of a solid-nitrogen-cooled continuous wave THz quantum cascade laser,” **Andriy A. Danylov**, Jerry Waldman, Alexander R. Light, Thomas M. Goyette, Robert H. Giles, Xifeng Qian, Neelima Chandrayan, William D. Goodhue, and William E. Nixon, *Proceedings of SPIE Photonics West* (forthcoming 2012).
2. “Coherent imaging at 2.4 THz with a CW quantum cascade laser transmitter,” **Andriy A. Danylov**, Thomas M. Goyette, Jerry Waldman, Michael J. Coulombe, Andrew J. Gatesman, Robert H. Giles, Xifeng Qian, Neelima Chandrayan, Shivashankar Vangala, Krongtip Termkoa, William D. Goodhue, and William E. Nixon, *Proceedings of SPIE* Vol. 7601, 72150C (2010).
3. “Frequency stabilization of a single mode terahertz quantum cascade laser to the kilohertz level,” **Andriy A. Danylov**, Thomas M. Goyette, Jerry Waldman, Michael J. Coulombe, Andrew J. Gatesman, Robert H. Giles, William D. Goodhue, Xifeng Qian, and William E. Nixon, 10th International Conference on Intersubband Transitions in Quantum Wells (ITQW), Montreal, (2009).
4. “Prospects for quantum cascade lasers as transmitters and local oscillators in coherent terahertz transmitter/receiver systems,” Jerry Waldman, **Andriy A. Danylov**, Thomas M. Goyette,

- Michael J. Coulombe, Robert H. Giles, Andrew J. Gatesman, William D. Goodhue, Jin Li, Kurt J. Linden, William E. Nixon, Proceedings of SPIE Vol. 7215, 72150C (2009).
5. "Terahertz sideband-tuned quantum cascade laser radiation and QCL linewidth measurements," **Andriy A. Danylov**, J. Waldman, T. M. Goyette, A. J. Gatesman, R. H. Giles, J. Li, W. D. Goodhue, K. J. Linden, W. E. Nixon, 33rd International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz) (2008).
 6. "2.4-2.5 THz quantum cascade lasers obtained by tuning the thicknesses of a structure emitting at 2.9 THz," J. Li, X. Qian, **A. A. Danylov**, J. Waldman, K. Linden, W. Liu, S.R. Vangala, R.H. Giles, W.D. Goodhue, Lasers and Electro-Optics Society, 2007. LEOS 2007. The 20th Annual Meeting of the IEEE.
 7. "Terahertz Behavior of Optical Components and Common Materials," A. J. Gatesman, **A. Danylov**, T. M. Goyette, J. C. Dickinson, R. H. Giles, W. Goodhue, J. Waldman, W. E. Nixon, and W. Hoen, SPIE Defense and Security Symposium, Vol. 6212, Orlando, FL, April (2006).
 8. "Terahertz Laser Based Standoff Imaging System," Kurt J. Linden, William R. Neal, Jerry Waldman, Andrew J. Gatesman, **Andriy Danylov**, Proceedings of the 34th Applied Imagery and Pattern Recognition Workshop (AIPR05).
 9. "Performance of Off-axis MBE Grown THz Quantum Cascade Lasers," Shivashankar R. Vangala, Xifeng Qian, Neelima Chandrayan, Dan Wasserman, and William D. Goodhue, **Andriy A. Danylov**, Robert H. Giles, and Jerry Waldman, W.E. Nixon, 26th North American Molecular Beam Epitaxy Conference (NAMBE) (2009).
 10. "Insitu Contact Resistance Evaluation of 2.6-2.9 THz Quantum Cascade Lasers," Neelima Chandrayan, Krongtip Tremkoa, Jin Li, Xifeng Qian, Shivashankar Vangala, William Goodhue, **Andriy Danylov**, Jerry Waldman, Robert Giles, William Nixon, APS March Meeting, Vol. 54, Number 1 (2009).
 11. "One-half milliwatt 2.33 THz CW QCL operating at 77 K," X. Qian, N. Chandrayan, S. R. Vangala, W. D. Goodhue, **A. A. Danylov**, J. Waldman, R. H. Giles, W. E. Nixon, SPIE Photonics West, OPTO, Terahertz Technology and Applications (forthcoming).

Professional services

Journal Reviewer: Optics Express, IEEE Sensors
Member of Optical Society of America, Member of SPIE