

Brendan Marozas

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SUMMARY

- Materials scientist and engineer with 8 years of research experience in optoelectronic devices, thin films, molecular beam epitaxy, compound semiconductors, optical materials, and renewable energy
- NASA Space Technology Research Fellow, collaborating with Jet Propulsion Lab to develop quantum structure infrared photodetectors for space-based application

TECHNICAL SKILLS

Modeling – MATLAB, Mathematica, Python, OptiLayer, LabView, C++

Deposition – Molecular Beam Epitaxy, Physical Vapor Deposition (Sputtering/Thermal/Electron-Beam)

Processing – Standard Photolithography, Laser Lithography, Mask Design, Wet Bench, Cleanroom

Characterization – Photoluminescence, X-Ray Diffraction, Atomic Force Microscopy, Scanning Electron Microscopy, Photothermal Heterodyne Imaging, Hall Effect, Ellipsometry, Reflectometry, Current-Voltage, Optical Modulation Response, Nomarski Microscopy, Profilometry (Contact/Optical), ImageJ

Other – Design of Experiments, Automation, Lab Management, Equipment Development/Integration

AWARDS

NASA Space Technology Research Fellowship, NSF Graduate Research Fellowship Program (Awarded), Semiconductor Research Corporation Undergraduate Research Award, Engineering Global Fellow (City, University of London), 1st Place at Cornell University Materials Science and Engineering Poster Session

EDUCATION

University of Rochester Ph.D. in Materials Science – Expected May 2020

Cornell University B.S. in Materials Science and Engineering – May 2014

RESEARCH EXPERIENCE

University of Rochester, Wicks MBE Laboratory 2014-Present

- Managed lab technology and resources, MBE steward, automated processes and enabled remote control
- Led group projects, trained lab members, and provided consultation on complex device issues
- Prepared research proposals and quarterly reports. Developed research collaborations with NASA Jet Propulsion Laboratory, Air Force Research Laboratory, and Center for Semiconductor Modeling
- Built models for bulk material and superlattice properties, designed heterojunction devices
- Grew compound semiconductors, quantum structures, and heterojunction devices with MBE
- Processed epitaxial growth into photodetector devices, developed and documented novel techniques
- Characterized and analyzed photodetector devices, material quality, and surface properties

University of Rochester, Laboratory for Laser Energetics 2011-2014

- Researched damage morphology of HfO₂ monolayers using Atomic Force Microscopy and image analysis
- Identified origin of damage using Photothermal Heterodyne Imaging and ray-trace modeling
- Characterized the system's annealing effects on HfO₂, for mitigation of laser induced damage

Cornell University, Van Dover Research Group 2011-2014

- Characterized optical properties of thin films using ellipsometry and reflectometry for fuel cell materials
- Grew and characterized thin films on a flexible ceramic substrate for photovoltaics/superconductors
- Conducted research for a small business, delivered results using high-throughput techniques

National Renewable Energy Laboratory, Process Development and Integration Laboratory 2013

- Led project to improve efficiency of silicon processing by locating cleanroom contamination sources
- Collaborated with National Institute of Standards and Technology (Boulder) to engineer a solution

PUBLICATIONS AND PRESENTATIONS

BT Marozas, “Modelling, Design, and Fabrication of Mid-Wave Infrared Photodetectors,” Presentation given at SONY Electronics, Rochester NY (2020).

BT Marozas, “MBE Growth of Structures for Mid-Wave Infrared Photodetectors,” Presentation given at the *Air Force Research Laboratory*, Albuquerque NM (2019).

BT Marozas, “Reduced Optical Coating Damage Through Continuous-Wave Laser Radiation Annealing,” Poster presented at the *Advanced Materials for Powerful Lasers Workshop*, Rochester NY (2018).

X Du, BT Marozas, GR Savich, GW Wicks, “Defect-related surface currents in InAs-based nBn infrared detectors,” *J. Appl. Phys.* **123**, 214504 (2018).

BT Marozas, WD Hughes, X Du, DE Sidor, GR Savich, GW Wicks, "Surface dark current mechanisms in III-V infrared photodetectors," *Opt. Mater. Express.* **8**, 1419 (2018).

X Du, GR Savich, BT Marozas, GW Wicks, "Suppression of Lateral Diffusion and Surface Leakage Currents in nBn Photodetectors Using an Inverted Design," *J. Elec. Mater.* **47**, 1038 (2018).

BT Marozas, “Investigation Superlattice Surface Characteristics,” Presentation given at the *Jet Propulsion Laboratory*, Pasadena CA (2017).

X Du, GR Savich, BT Marozas, GW Wicks, "Effects of Epitaxial Structure and Processing on Electrical Characteristics of InAs-based nBn Infrared Detectors," *SPIE Proc.* **10177**, (2017).

DE Sidor, GR Savich, BT Marozas, X Du, TA O'Loughlin, GD Jenkins, WD Hughes, CP Morath, VM Cowan, GW Wicks, "MBE Growth Techniques for InAs-based nBn IR Detectors," *J. Vac. Sci. Tech. B* **35**, 02B117 (2017).

TA O'Loughlin, GR Savich, DE Sidor, BT Marozas, TD Golding, KD Jamison, L Fredin, B Fowler, W Priyantha, GW Wicks, “Mid-IR resonant cavity detectors,” *J. Vac. Sci. Tech. B* **35**, 02B111 (2017).

S Papernov, AA Kozlov, JB Oliver, TJ Kessler, A Shyvdky, BT Marozas, “Near-ultraviolet absorption annealing in hafnium oxide thin films subjected to continuous-wave laser radiation,” *Optical Engineering* **53**, 122504 (2014).

BT Marozas, “Biaxial Thin Film Growth on Polycrystalline Ceramic Substrates,” Poster presented at the *Cornell University Materials Science and Engineering Poster Session*, Ithaca NY (2014).