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1. Higher Education

2009 Ph.D., Electrical Engineering, Princeton University
Passive and Active Mid-Infrared Semiconductor Nanostructures: Three-Dimensional Metamaterials and High Wall Plug Efficiency Quantum Cascade Lasers
Advisor: Prof. Claire Gmachl, Ph.D.

2006 M.A., Electrical Engineering, Princeton University

2004 B.S., Physics with Honors, University of Maryland Baltimore County

2. Previous Positions

2009 – 2011 Postdoctoral Research Associate, Princeton University
Superconducting qubits and circuits
Advisor: Prof. Andrew Houck

3. Scholarships and Fellowships

- Princeton University Charlotte Elizabeth Proctor Honorific Fellowship
- University of Maryland Baltimore County Presidential Scholarship

4. Distinctions, Honors, and Awards

- IEEE Senior Member (2017)
- Department of Electrical Engineering Undergraduate Teaching Award (2015)
- National Science Foundation CAREER Award (2014)
- Newport Award in Photonics (2008)
- Princeton Engineering Wu Prize for Excellence (2008)
- University of Maryland Baltimore County Class Valedictorian (2004)
- Langenberg Undergraduate Physics Research Award (2004)
- University of Maryland Alumni Association Award for Physics (2003, 2004)

5. PUBLICATIONS & PRESENTATIONS

Web of Science Citation Metrics (2/07/18): 61 publications, 1449 citations, *h*-index: 15

1. O. Dominguez, L. Nordin, J. Liu, K. Feng, D. Wasserman, and A.J. Hoffman, "Monochromatic Multimode Nanoantennas on Epsilon-Near-Zero Substrates," *submitted to Nature Communications.*

2. E. Matlis, T. Corke, B. Neiswander, and A.J. Hoffman, "Electromagnetic wave transmittance control using self-organized plasma lattice metamaterial," *under review at Journal of Applied Physics.*

3. K. Feng, D.L. Sivco, and A.J. Hoffman, "Engineering optical emission in sub-diffraction hyperbolic metamaterial resonators," *Optics Express* **26**, 4382 (2018).

4. L. Nordin, O. Dominguez, C. Roberts, W. Streyer, K. Feng, Z. Fang, V.A. Podolskiy, A.J. Hoffman, and D. Wasserman, "Mid-infrared epsilon-near-zero modes in ultra-thin phononic films," *Applied Physics Letters* **111**, 091105 (2017).

5. K. Feng, G. Harden, D.L. Sivco, and A.J. Hoffman, "Sub-diffraction Confinement in All-semiconductor Hyperbolic Metamaterial Resonators," *ACS Photonics* **4**, 1621-1626 (2017).

6. Y.I. Cui, M.P. Harter, Y. Dikmelik, and A.J. Hoffman, "Importance of Coherence in Models of Mid-infrared Quantum Cascade Laser Gain Spectra," *Journal of Optics* **19**, 095201 (2017).

7. O. Dominguez, T.L. McGinnity, R.K. Roeder, and A.J. Hoffman, "Optical characterization of polar HfO_2 nanoparticles in the mid- and far-infrared," *Applied Physics Letters* **111**, 011101 (2017).

8. T. Ahmed, T. Liu, T.P. Butler, J.M. Kulick, G.H. Bernstein, A.J. Hoffman, D.C. Hall, and S.S. Howard, "Mid-infrared Waveguide Array Inter-Chip Coupling Using Optical Quilt Packaging," *IEEE Photonics Technology Letters* **29**, 755-758 (2017).

9. O. Dominguez, T.L. McGinnity, R.K. Roeder, and A.J. Hoffman, "Mid- and far-infrared optical characterization of monoclinic HfO2 nanoparticles and evidence of localized surface phonon polaritons," *Proceedings SPIE* **10100**, 101001G (2017).

10. G.H. Harden, L.E. Cortes-Herrera#, and A.J. Hoffman, "Optical pathlength and trajectory stability in rotationally asymmetric multipass cells," *Optics Express* **24**, 19497 (2016).

11. T.L. McGinnity, O. Dominguez, T.E. Curtis, P. Nallathamby, A.J. Hoffman, and R.K. Roeder, "Hafnia (HfO2) nanoparticles as an X-ray contrast agent and mid-infrared phononic material," *Nanoscale* **8**, 13627 (2016).

12. K. Feng, G. Harden, D.L. Sivco, and A.J. Hoffman, "Sub-diffraction Resonators in Semiconductor Hyperbolic Metamaterials," OSA Latin America Optics and Photonics Conference, paper LTu2A.1 (2016). **Invited**

13. W. Streyer, K. Feng, Y. Zhong, A.J. Hoffman, and D. Wasserman, "Engineering the Reststrahlen band with hybrid plasmon/phonon excitations," *MRS Communications* **6**, 1-8 2015.

14. K. Feng, W. Streyer, Y. Zhong, A.J. Hoffman, and D. Wasserman, "Photonics materials, structures, and devices for *Reststrahlen* optics," *Optics Express* **23**, A1418 (2015).

15. K. Feng, W. Streyer, S.M. Islam, J. Verma, D. Jena, D. Wasserman, and A.J. Hoffman, "Localized surface phonon polariton resonances in polar gallium nitride," *Applied Physics Letters* **107**, 081108 (2015).

16. W. Streyer, K. Feng, Y. Zhong, A.J. Hoffman, and D. Wasserman, "Selective absorbers and thermal emitters for far-infrared wavelengths," *Applied Physics Letters* **107**, 081105 (2015).

17. W. Streyer, A. Rosenberg, S. Law, C. Roberts, V.A. Podolskiy, A.J. Hoffman, and D. Wasserman, "Engineering absorption and blackbody radiation in the far-infrared with surface phonon polaritons on gallium phosphide," *Applied Physics Letters* **104**, 131105 (2014).

18. Y. Yao, A.J. Hoffman, and C. Gmachl, "Mid-infrared quantum cascade lasers", *Nature Photonics* **6**, 432-439 (2012).

19. A.J. Hoffman, S. Srinivasan, J. Gambetta, and A.A. Houck, "Coherent control of a superconducting qubit with dynamically tunable qubit-cavity coupling," *Physical Review B* **84**, 184515 (2011).

20. A.J. Hoffman, S. Srinivasan, S. Schmidt, L. Spietz, J. Aumentado, H.E. Tureci, and A.A. Houck, "Dispersive Photon Blockade in a Superconducting Circuit," *Physical Review Letters* **107**, 053602 (2011).

21. S. Srinivasan, A.J. Hoffman, J. Gambetta, and A.A. Houck, "Tunable coupling in circuit quantum electrodynamics with a superconducting V-system," *Physical Review Letters* **106**, 083601 (2011).

22. M.D. Escarra, S. Thongrattanasiri, W.O. Charles, A.J. Hoffman, V.A. Podolskiy, and C. Gmachl, "Enhanced bandwidth and reduced dispersion through stacking multiple optical metamaterials," *Optics Express* **19**, 14990 (2011).

23. P.Q. Liu, A.J. Hoffman, M.D. Escarra, K.J. Franz, J.B. Khurgin, Y. Dikmelik, X.J. Wang, J.-Y. Fan, C.F. Gmachl, "Highly Power-efficient Quantum Cascade Lasers," *Nature Photonics* **4**, 95 (2010).

24. M.D. Escarra, A. Benz, A.M. Bhatt, A.J. Hoffman, J. Wang, J. Fan, C. Gmachl, "Thermoelectric effect in quantum cascade lasers," *IEEE Photonics Journal* **2**, 501 (2010).

25. K.J. Franz, P.Q. Liu, J. Raftery, M.D. Escarra, A.J. Hoffman, S.S. Howard, Y. Yao, Y. Dikmelik, X. Wang, J. Fan, J.B. Khurgin, and C. Gmachl, "Short Injector Quantum Cascade Lasers," *IEEE Journal of Quantum Electronics* **46**, 591 (2010).

26. A.J. Hoffman, P.X. Braun, M.D. Escarra, S.S. Howard, K.J. Franz, and C. Gmachl, "Lasing-induced reduction of core heating in high wall plug efficiency quantum cascade lasers," *Applied Physics Letters* **94**, 041101 (2009).

27. A.J. Hoffman, L. Alekseyev, A. Sridhar, P.X. Braun, S.S. Howard, K.J. Franz, D. Wasserman, V.A. Podolskiy, E.E. Narimanov, D.L. Sivco, and C. Gmachl, "Mid-infrared Semiconductor Optical Metamaterials," *Journal of Applied Physics* **105**, 122411 (2009).

28. M.D. Escarra, A.J. Hoffman, K.J. Franz, S.S. Howard, R. Cendejas, X.J. Wang, J.-Y. Fan, C. Gmachl, "Quantum cascade lasers with voltage defect of less than one longitudinal optical phonon energy," *Applied Physics Letters* **94**, 251114 (2009).

29. Y. Yao, K.J. Franz, Z. Liu, A.J. Hoffman, C.F. Gmachl, "Voltage tuning of gain spectra in quantum cascade lasers," *Proceedings SPIE* **7230**, 723012 (2009).

30. Y. Yao, Z.J. Liu, A.J. Hoffman, K.J. Franz, C.F. Gmachl "Voltage Tunability of Quantum Cascade Lasers," *IEEE Journal of Quantum Electronics* **45**, 730 (2009).

31. J.B. Khurgin, Y. Dikmelik, P.Q. Liu, A.J. Hoffman, M.D. Escarra, K.J. Franz, C.F. Gmachl "Role of interface roughness in the transport and lasing characteristics of quantum-cascade lasers," *Applied Physics Letters* **94**, 091101 (2009).

32. C.R. Young, R. Cendejas, S.S. Howard, W. Sanchez-Vaynshteyn, A.J. Hoffman, K.J. Franz, Y. Yao, B. Mizaikoff, X. Wang, J.-Y. Fan, C. Gmachl "Wavelength selection for quantum cascade lasers by cavity length," *Applied Physics Letters* **94**, 091109 (2009).

33. E.N. Bentil, F. Toor, A.J. Hoffman, M.D. Escarra, C. Gmachl, "Rapid and Minimally Invasive Quantum Cascade Wafer Testing," *IEEE Photonics Technology Letters* **21**, 531 (2009).

34. K.J. Franz, S. Menzel, A.J. Hoffman, D. Wasserman, J. Cockburn, C. Gmachl "High k-space lasing in a dual wavelength quantum cascade laser," *Nature Photonics* **3**, 50 (2008).

35. A.J. Hoffman, V.A. Podolskiy, D.L. Sivco, and C. Gmachl, "Sub-diffraction negative and positive index modes in mid-infrared waveguides," *Optics Express* **16**, 16404 (2008).

36. S.S. Howard, D.P. Howard, A.J. Hoffman, K.J. Franz, D.L. Sivco, and C. Gmachl, "The effect of injector barrier thickness and doping level on current transport and optical transition width in a $\lambda \sim 8$ μm QC structure," *Applied Physics Letters* **93**, 191107 (2008).

37. K.J. Franz, W.O. Charles, A. Shen, A.J. Hoffman, M.C. Tamargo, C. Gmachl, "ZnCdSe/ZnCdMgSe Quantum Cascade Electroluminescence," *Applied Physics Letters* **92**, 121105 (2008).

38. A.J. Hoffman, S. Schartner, S.S. Howard, K.J. Franz, F. Towner, C. Gmachl, "Low voltage-defect quantum cascade Laser with heterogeneous injector regions," *Optics Express* **15**, 15818 (2007).

39. A.J. Hoffman, L. Alekseyev, S.S. Howard, K.J. Franz, D. Wasserman, V.A. Podolskiy, E.E. Narimanov, D.L. Sivco, C. Gmachl, "Negative refraction in semiconductor metamaterials," *Nature Materials* **6**, 946 (2007).

40. S.S. Howard, Z. Liu, D. Wasserman, A.J. Hoffman, T.S. Ko, C. Gmachl, "High-Performance Quantum Cascade Lasers: Optimized Design Through Waveguide and Thermal Modeling." IEEE Journal Select Topics Quantum Electronics **13**, 1054 (2007).

41. K.J. Franz, D. Wasserman, A.J. Hoffman, D.C. Jangraw, K.-T. Shiu, S.R. Forest, C. Gmachl, "Evidence of cascaded emission in a dual-wavelength Quantum Cascade laser," *Applied Physics Letters* **90**, 091104 (2007).

42. Z.Y. Zhao, C. Yi, A.D. Stiff-Roberts, A.J. Hoffman, D. Wasserman, C. Gmachl, "Probing dopant incorporations in InAs/GaAs QDIPs by polarization-dependent Fourier transform infrared spectroscopy," *Infrared Physics & Technology*, **51**, 131 (2007).

43. Z. Liu, D. Wasserman, S. S. Howard, A. J. Hoffman, C. Gmachl, X. Wang, T. Tanbun-Ek, L. Cheng, and F. Choa. "Room temperature continuous wave quantum cascade lasers grown by MOCVD without lateral regrowth." *IEEE Photonics Technology Letters* **18**, 1347 (2006).

CONFERENCE PRESENTATIONS

1. K. Feng, G. Harden, D.L. Sivco, and A.J. Hoffman, "Sub-Diffraction Confinement in all Semiconductor Hyperbolic Metamaterial Resonators" *Electronic Materials Conference*, Notre Dame, IN (2017).

2. G.H. Harden, SM M. Islam, K. Lee, J. Lu, C. Aydinkarahaliloglu*, V. Protasenko, H.G. Xing, D. Jena, and A.J. Hoffman, "Deep-UV Emission and Optical Gain Measurements in Optically-Pumped AlN/AlGaN Quantum Well Structures," *Electronic Materials Conference*, Notre Dame, IN (2017).

3. O. Dominguez, L.J. Nordin, D. Wasserman, and A.J. Hoffman, "Field Enhancement and Coupling in Epsilon-near-zero Materials Using Thin Films," *Electronic Materials Conference*, Notre Dame, IN (2017).

4. O. Dominguez, L.J. Nordin, K. Feng, J. Lu, D. Wasserman, and A.J. Hoffman, "Exciting Localized Modes in Polar Epsilon-Near-Zero Materials," *Conference on Lasers and Electro-optics*, San Jose, CA (2017).

5. G.H. Harden, SM Islam, K. Lee, V. Protasenko, H.G. Xing, D. Jena, and A.J. Hoffman, "Deep-UV Emission and Optical Gain Measurements in Optically-Pumped AlN/GaN Quantum Well Structures," *Material Research Society Spring Meeting*, Phoenix, AZ (2017).

6. E. Matlis, A.J. Hoffman, and T. Corke, "Experiments on a Plasma-based Metamaterial at Microwave Frequencies," *55th AIAA Aerospace Sciences Meeting*, Grapevine, TX (2017).

7. K. Feng, G. Harden, D.L. Sivco, C. Gmachl, and A.J. Hoffman, "Nanoscale Hyperbolic Metamaterial Cavities in Semiconductors," *Conference on Lasers and Electro-optics*, San Jose, June 2016.

8. G.H. Harden, L.E. Cortes-Herrera, and A.J. Hoffman, "Stability of Optical Trajectories in Rotationally Asymmetric Multipass Cells," *Conference on Lasers and Electro-optics*, San Jose, June 2016.

9. Y. Cui, Y. Dikmelik, and A.J. Hoffman, "Role of coupling and dephasing in the optical gain spectrum of mid-infrared quantum cascade lasers," *Electronics Materials Conference*, Columbus, OH, June 2015.

10. K. Feng, W. Streyer, S.M. Islam, J. Verma, D. Jena, D. Wasserman, and A.J. Hoffman, "Localized Surface Phonon Polariton Resonators in GaN," *Electronics Materials Conference*, Columbus, OH, June 2015.

11. W. Streyer, K. Feng, C. Roberts, V. Podolskiy, A.J. Hoffman, and D. Wasserman, "Far-infrared metamaterial for perfect absorption and wavelength-flexible selective thermal emission," *Electronics Materials Conference*, Columbus, OH, June 2015.

12. K. Feng, W. Streyer, S.M. Islam, J. Verma, D. Jena, D. Wasserman, and A.J. Hoffman, "Localized Surface Phonon Polariton Resonators in GaN," *Conference on Lasers and Electro-optics*, San Jose, CA, June 2015.

13. M.P. Harter, Y. Dikmelik, A.J. Hoffman, "Electron localization in quantum cascade heterostructures due to interface roughness," *Conference on Lasers and Electro-optics*, San Jose, CA, June 2014

14. T. Ahmed, A.A. Khan, G. Vigil, J.M. Kulick, G.H. Bernstein, A.J. Hoffman, and S.S. Howard, "Optical Quilt Packaging: A New Chip-to-chip Optical Coupling and Alignment Process for Modular Sensors," *Conference on Lasers and Electro-optics*, San Jose, CA, June 2014.

15. T. Ahmed, T. Butler, A. Khan, J. Kulick, G. Bernstein, A.J. Hoffman, and S. Howard, "FDTD Modeling of Chip-to-Chip Waveguide Coupling for Optical Quilt Packaging," *SPIE Optics and Photonics*, 2013.

16. M.P. Harter, Y. Dikmelik, and A.J. Hoffman, "Effects of interface roughness on difference frequency generation in quantum cascade laser sources," *Intersubband Transitions and Quantum Wells 2013*, Bolton Landing, NY, October 2013.

17. D. Underwood, W. Shanks, A.J. Hoffman, J. Koch, and A.A Houck, "Disorder in a Kagome Lattice of Superconducting Coplanar Waveguide Resonators," *APS*, Boston, MA, March 2012.

18. J. Raftery, D. Underwood, W. Shanks, S. Srinivasan, A. Hoffman, H. Tureci, and A.A. Houck, "Experimental investigation of a nonequilibrium delocalization/localization transition of photons in circuit quantum electrodynamics," *APS*, Boston, MA, March 2012.

19. S. Srinivasan, A.J. Hoffman, Y. Liu, J. Gambetta, and A.A. Houck, "Fast, coherent control of a tunable coupling qubit," *APS*, Boston, MA, March 2012.

20. S. Srinivasan, A.J. Hoffman, Y. Liu, J. Gambetta, and A.A. Houck, "Tunable coupling cavity QED with a superconducting artificial atom," *Conference on Lasers and Electro-optics*, San Jose, CA, May 2012.

21. A.J. Hoffman, S. Srinivasan, J. Gambetta, and A.A. Houck, "Purcell protection and cycling transition measurement with a superconducting V-system," *APS*, Dallas, TX, March 2011.

22. S. Srinivasan, A.J. Hoffman, J. Gambetta, and A.A. Houck, "Tunable coupling in circuit quantum electrodynamics with a superconducting V-system," *APS*, Dallas, TX, March 2011.

23. D. Underwood, A. Safira, S. Srinivasan, A.J. Hoffman, J. Koch, and A.A. Houck, "Microwave cavity lattices for simulating condensed matter systems," *APS*, Dallas, TX, March 2011.

24. A.J. Hoffman, S. Srinivasan, B. Shim, L. Spietz, J. Aumentado, and A.A. Houck, "Photon Blockade in Circuit Quantum Electrodynamics," *APS*, Portland, OR, March 2010.

25. S. Srinivassan, A.J. Hoffman, and A.A. Houck, "Straddling Regime of a Transmon Qubit," *APS*, Portland, OR, March 2010.

26. A.J. Hoffman, P.X. Braun, M.D. Escarra, S.S. Howard, K.J. Franz, and C. Gmachl, "Instantaneous Power and Threshold in Continuous Wave Quantum Cascade Lasers," *Conference on Lasers and Electro-optics*, Baltimore, MD, 2009.

27. M.D. Escarra, A.J. Hoffman, K.J. Franz, S.S. Howard, and C. Gmachl, "Ultra-low Defect Quantum Cascade Lasers," *Conference on Lasers and Electro-optics*, Baltimore, MD, 2009.

28. Brenner, X.G. Peralta, W.J. Padilla, E. Young, A.J. Hoffman, M. Cich, R.D. Averitt, M. Wanke, J.B. Wright, H. Chen, J.F. O'Hara, A.J. Taylor, "External Modulation of Terahertz Quantum Cascade Lasers Using Metamaterials," *META*, October 2008.

29. A.J. Hoffman, V.A. Podolskiy, D.L. Sivco, and C. Gmachl, "Left-handed mid-infrared waveguides," *International Conference on the Physics of Semiconductors 2008*, Rio de Janeiro, Brazil, August 2008. ***Invited***

30. K.J. Franz, S. Menzel, D. Wasserman, A.J. Hoffman, J.W. Cockburn, and C. Gmachl, "High k-space lasing in excited state quantum cascade lasers," *International Conference on the Physics of Semiconductors 2008*, Rio de Janeiro, August 2008.

31. A.J. Hoffman, M.D. Escarra, S.S. Howard, K.J. Franz, X.J. Wang, J.Y. Fan, and C. Gmachl, "Strategies for Improved Wall-plug Efficiency in Quantum Cascade Lasers," *Mid-infrared Optical Materials and Devices IX*, Freiberg, Germany, September 2008.

32. K.J. Franz, W.O. Charles, A. Shen, A.J. Hoffman, M.C. Tamargo, and C. Gmachl, "Quantum Cascade Electroluminescence from a ZnCdSe/ZnCdMgSe on InP Structure," *Mid-infrared Optical Materials and Devices IX*, Freiberg, Germany, September 2008.

33. K.J. Franz, P.Q. Liu, A.J. Hoffman, S.S. Howard, M.D. Escarra, Yamac Dikmelik, J.B. Khurgin, X. Wang, J.Y. Fan, and C. Gmachl, "Short Injector Regions for Improved Quantum Cascade Laser Performance," *IQCLSW 2008*, Monte Verita, Switzerland, September 2008.

34. A.J. Hoffman, S. Schartner, S.S. Howard, K.J. Franz, F. Towner, C. Gmachl, "Low voltage-defect quantum cascade Laser," *Conference on Lasers and Electro-optics*, San Jose, CA, May 2008.

35. K.J. Franz, W.O. Charles, A. Shen, A.J. Hoffman, M.C. Tamargo, C. Gmachl, "Intersubband Electroluminescence from a ZnCdSe/ZnCdMgSe Quantum Cascade Structure," *Conference on Lasers and Electro-optics*, San Jose, CA, May 2008.

36. Y. Dikmelik, J.B. Khurgin, A.J. Hoffman, S.S. Howard, K.J. Franz, C.F. Gmachl, "Excited-State Absorption in High-Power Mid-Infrared Quantum Cascade Lasers," *Conference on Lasers and Electro-optics*, San Jose, CA, May 2008.

37. S. Menzel, K.J. Franz, D. Wasserman, A.J. Hoffman, J.W. Cockburn, C.F. Gmachl, "Laser Action at High k-Space Values in Anti-Correlated Multi-Wavelength Quantum Cascade Lasers," *Conference on Lasers and Electro-optics*, San Jose, CA, May 2008.

38. K.J. Franz, S. Menzel, A.J. Hoffman, D. Wasserman, J. Cockburn, C. Gmachl, "High k-space lasing in quantum cascade lasers," *PRISM/PCCM/MIRTHE Industry Day*, Princeton, NJ, Mar 2008

39. M.D. Escarra, A.J. Hoffman, S.S. Howard, K.J. Franz, X. Wang, M. Fong, and C. Gmachl, "High Efficiency Quantum Cascade Lasers," *PRISM/PCCM/MIRTHE Industry Day*, Princeton, NJ, Mar 2008.

40. M.D. Escarra, A.J. Hoffman, S.S. Howard, K.J. Franz, A. Sridhar, C. Gmachl, "High Efficiency Quantum Cascade Lasers," *APS*, New Orleans, LA, March 2008.

41. M.D. Escarra, S.S. Howard, A.J. Hoffman, C. Gmachl, "Reduced contact resistance in quantum cascade lasers," *APS*, New Orleans, LA, Mar 2008.

42. A.J. Hoffman, S. Schartner, S.S. Howard, F. Towner, and C. Gmachl, "Low-Voltage Defect Quantum Cascade Laser with Heterogeneous Injector Regions," *IEEE LEOS Annual Meeting*, Lake Buena Vista, FL, Oct 2007.

43. S.S. Howard, A.J. Hoffman, D.P. Howard, T. Ko, D.L. Sivco, C. Gmachl, "Effect of Injection Barrier Thickness and Doping on Transport and Gain in a λ=8.2 μm Quantum Cascade Laser," *IEEE LEOS Annual Meeting*, Lake Buena Vista, FL, Oct 2007.

44. K.J. Franz, S. Menzel, A.J. Hoffman, D. Wasserman, K.-T. Shiu, S.R. Forrest, C. Gmachl, "Excited State Optical Transitions in Quantum Cascade Lasers for Low Thresholds and Multi-Wavelength Emission," *International Conference on Intersubband Transitions in Quantum Wells*, Ambleside, Cumbria, U.K., Sept 2007.

45. S.S. Howard, A.J. Hoffman, K.J. Franz, T. Ko, C. Gmachl. "Current Injection Transition Broadening in Quantum Cascade Lasers." *International Conference on Intersubband Transitions in Quantum Wells*, Ambleside, Cumbria, U.K, September, 2007.

46. A.J. Hoffman, L. Alekseyev, S.S. Howard, D.L. Sivco, E.E. Narimanov, and C. Gmachl, "Negative refraction in mid-infrared semiconductor metamaterials," *Conference on Lasers and Electro-optics*, Baltimore, MD, May 2007.

47. K.J. Franz, D. Wasserman, A.J. Hoffman, K.-T. Shiu, S.R. Forrest, C. Gmachl, "Cascaded Emission in a Dual-Wavelength Quantum Cascade Laser," *Conference on Lasers and Electro-optics*, Baltimore, MD, May 2007.

48. A.J. Hoffman, L. Alekseyev, S.S. Howard, D.L. Sivco, E.E. Narimanov, and C. Gmachl, "Demonstration of negative refraction in semiconductor metamaterials," *Mid-infrared Optical Materials and Devices-VIII*, Bad Ischl, Austria, May 2007.

49. A.J. Hoffman, L. Alekseyev, D.L. Sivco, E.E. Narimanov, and C. Gmachl, "Transmission and Reflection of Highly Anisotropic Layered Semiconductor Structures with Plasmonic Resonances" *Optics East*, Boston, MA, October 2006.

50. A.J. Hoffman, L. Alekseyev, D.L. Sivco, E.E. Narimanov, and C. Gmachl, "Mid-infrared Excitation of Plasmonic Resonances in Highly Anisotropic Layered Semiconductor Structures" *International Conference on the Physics of Semiconductors 28*, Vienna, Austria, July 2006.

51. A.J. Hoffman, L. Alekseyev, E. E. Narimanov, C. Gmachl, and D. L. Sivco. "Mid-infrared transmission and reflection measurements of degenerately doped quantum wells." *APS*, Baltimore, MD, March, 2006.

52. S. Howard, F. Toor, A. J. Hoffman, and C. Gmachl. "Optimizing planar waveguide design for multi-wavelength and nonlinear quantum cascade lasers." *APS*, 2006, Baltimore, MD.
53. A.J. Hoffman and L.M. Hayden, "Thin SiO2 Charge Barrier Layers in Poled Nonlinear Polymers," *ACS*, Philadelphia, PA 2004.

6. PATENTS

1. D. Hall; S. Howard; A. Hoffman; G. Bernstein; J. Kulick, "Method and Device for Optical Waveguide Coupling," Patent Number: 9,620,473 B1; filed: January 17, 2014.

2. Q. Liu; Y. Yao; A.J. Hoffman, M. Escarra; K.J. Franz; J. Khurgin; Y. Dikmelik; W.O. Charles; J. Chen; and C.F. Gmachl, "Highly power-efficient and broadband quantum cascade lasers," Patent Number: 8,644,358; filed: June 8, 2009.

3. A.J. Hoffman; S.S. Howard; K.J. Franz; and G. Slowinski, "Pseudo-CW Operated Laser System," Patent Pedning, GTK Techcom, LLC 2011.

7. INVITED LECTURES AND ADDRESSES

1. A.J. Hoffman, "Optical Engineering in the *Reststrahlen* band: New Materials and Devices for the Mid- and Far-infrared," Center for Translational Applications of Nanoscale Multiferroic Systems, University of California Los Angeles (2018).
2. A.J. Hoffman, "Mid- and Far-infrared Nanophotonics: Learning to Live with Phonons," Northwestern University Department of Physics and Astronomy Department Seminar, Evanston, IL (2016).
3. A.J. Hoffman, "Mid- and Far-infrared Nanophotonics: Learning to Live with Phonons," Latin America Conference on Optics and Photonics, Columbia (2016).
4. A.J. Hoffman, "Quantum Engineering: Quantum Cascade Lasers and Intersubband Polariton Emitters," University of Illinois Urbana-Champaign, Urbana, IL (2015).
5. A.J. Hoffman, "Engineering and Controlling Interactions in the Circuit Quantum Electrodynamics Paradigm," IBM T.J. Watson Research Center, Yorktown Heights, NY (2014).
6. A.J. Hoffman, "The Role of Interface Roughness in Mid-infrared and Nonlinear THz Quantum Cascade Lasers," Department of Physics, University of Notre Dame, Notre Dame, IN (2014).
7. A.J. Hoffman, V.A. Podolskiy, D.L. Sivco, and C. Gmachl, "Left-handed mid-infrared waveguides," International Conference on the Physics of Semiconductors 2008, Rio de Janeiro, Brazil, August 2008.

8. GRANTS AND SPONSORED PROGRAMS

External Sponsored Research

1. **"Mid-infrared Photonic Integrated Circuits for Stand-off Detection of Trace Explosives"**

- Principal Investigator: Anthony Hoffman
- Source of Support: Department of Homeland Security
    - Subcontract from the DHS Awareness and Localization of Explosives Related Threats (ALERT) Center of Excellence
- Total Budget: $195k

2. **"Professional Development: Deep Ultraviolet Sources for Next Generation Raman"**

- Principal Investigator: Anthony Hoffman
- Source of Support: Department of Homeland Security
    - Subcontract from the DHS Awareness and Localization of Explosives Related Threats (ALERT) Center of Excellence
- Total Budget: $67k

3. **"Coupling Optical Phonons to Free Space Photons: A Feasibility Study"**

- Principal Investigators: Daniel Wasserman (University of Texas Austin), Anthony Hoffman (Co-PI)
- Source of Support: Army Research Office
    - Subcontract from University of Texas Austin
- Total Budget: $50k

4. **"Collaborative Research: Development of Optoelectronic Devices for the Far-Infrared"**

- Principal Investigators: Anthony Hoffman and Daniel Wasserman (University of Texas Austin)
- Source of Support: National Science Foundation
- Total Budget: $400k

5. **"EAGER: Collaborative Proposal: R-Optics, Light in the Optical No Man's Land"**

- Principal Investigators: Anthony J. Hoffman and Daniel Wasserman (University of Illinois Urbana Champaign)
- Source of Support: National Science Foundation
- Total Budget: $150k
- Duration: 6/15/2014 – 11/30/2015

6. **"Chaotic Cavity Gas Cell for Optical Trace Explosives Detection"**

- Principal Investigator: Anthony Hoffman
- Source of Support: Department of Homeland Security
- Total Budget: $200k

7. **"CAREER: Mid-infrared Intersubband Polariton Emitters"**

- Principal Investigator: Anthony Hoffman
- Source of Support: National Science Foundation
- Total Budget: $500k

8. **"Mid-infrared Ultrastrong Coupling Polariton Emitters"**

- Principal Investigator: Anthony Hoffman
- Source of Support: National Science Foundation
- Total Budget: $337k

9. **"Holographic Assembly of Reconfigurable Nanoscale Plasmonic and Photonic Elements"**

- Principal Investigator: Paul Bohn (University of Notre Dame)
- Source of Support: DARPA
- Total Budget: $900k

10. **"Assessment of and Improvements to Sub-surface Resolution of Scanning Near-field Microwave Microscope"**

- Principal Investigator: Jonathan Chisum (University of Notre Dame)
- Source of Support: DARPA
- Total Budget: $114k

Student Fellowships

Junchi Lu
- Sigma Xi Research Grant

John Haug, Ph.D. Advisee
- University of Notre Dame Deans' Fellowship

Irfan Khan, Ph.D. Advisee
- Fulbright Fellowship

Owen Dominguez, Ph.D. Advisee
- GEM Ph.D. Engineering Fellowship

Michael Harter, Ph.D. Advisee
- University of Notre Dame Presidential Fellowship

Travel Grants: Owen Dominguez (Ph.D. Advisee), Junchi Lu (Ph.D. Advisee), Galen Harden (Ph.D. Advisee)

Current Doctoral Advising

John Haug (1st year PhD), Irfan Khan (2nd year PhD), Ahmet Cagri Aydinkarahaliloglu (2nd year PhD), Junchi Lu (3rd year PhD), Owen Dominguez (4th year PhD), Galen Harden (4th year PhD), Kaijun Feng (5th year PhD, Defending 2018)

9. PROFESSIONAL MEMBERSHIPS

- **Institute of Electrical and Electronics Engineers (IEEE)**, *Senior Member*
    - *Calumet/Northern Indiana IEEE Photonics Society and Electron Devices Society Chair (2016 – 2017), Vice-Chair (2015).* Hosted guest speakers and organized IEEE/Notre Dame Annual Symposium on Photonics and Electronics. Obtained funding via multiple grants from IEEE and support from external sponsors.
- **The International Society for Optics and Photonics (SPIE)**, *Member*
    - *University of Notre Dame SPIE Student Chapter Advisor (2013 – present)*. Organize speakers, student events, and general support for the student chapter.

- **Optical Society of America (OSA)**, *Member*
- **American Physical Society (APS)**, *Member*

10. OTHER NOTABLE CONTRIBUTIONS

Service and Outreach

- Engineering Day with Clay Middle School (2017)
    - Day-long outreach event where middle school students interact with graduate students through optics-based experiments and demonstrations that are intended instruct students on the basics of optics and to generate excitement for learning, science, and technology
- Organize and support Annual IEEE/ND Graduate Research Symposium (2015 – 2017)
- Northern Indiana Science and Engineering Fair Head Section Judge (2012 – 2014)
- Undergraduate and high school research mentor, high-school student selected as finalist in the Intel Science and Engineering Fair (2012-present, 2013 student award)

Department/University Service

- Department of Electrical Engineering Curriculum Review Committee (2017-2018)
- Graduate Committee (2 years)
- Undergraduate Committee (4 years)
- Undergraduate Class Mentor for Class of 2015 and 2019
- Chair and organizer of Solid State Seminar (2 years)
- Graduate Admissions Committee (3 years)
- Marshall, University of Notre Dame Commencement (2014 – 2016)

Professional Service

- Associate Editor for Optics Express (2017, 3 year term and renewable for 3 additional years)
- IEEE Photonics Conference Subcommittee on Photonic Materials and Metamaterials (2015 – 2017)
- Electronic Materials Conference Program Committee (2015, 2017, and 2018)
- IEEE Calumet Section Joint Photonics Society and Electron Devices Society Chapter Chair (2016 – 2017) and Vice-Chair (2015).

- *Journal Referee:* Nature, Nature Photonics, Nature Communications, Scientific Reports, Applied Physics Letters, Physical Review Letters, Optics Express, Optical Materials Express, IEEE Journal of Quantum Electronics, ACS Nanoletters, ACS Photonics, Physical Review B, Journal of Applied Physics, IEEE Photonics Technology Letters
- *Proposal Reviewer:* National Science Foundation ECCS (STTR, MRI, and regular submission), National Science Foundation of Poland, Optical Society of America grant panel