

AMY C SULLIVAN

Department of Physics and Astronomy
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PROFESSIONAL EXPERIENCE

- 2008 – present** *Agnes Scott College, Decatur, GA*
Clare Boothe Luce Assistant Professor of Physics
- 2001 – 2003** *Coherent Technologies, Louisville, CO (now Lockheed Martin Coherent Technologies)*
Research Engineer I/II
- 2000 – 2001** *Displaytech, Inc.*
Professional Research Assistant

EDUCATION

- 2004 – 2008** *University of Colorado at Boulder*
PhD in Physics
Dissertation topic: “Tomographic Characterization of Volume Photopolymers for Integrated Optics” directed by Robert R. McLeod
- 1999 – 2001** *University of Colorado at Boulder*
Master of Science in Physics, Spring 2001
- 1995 – 1998** *Bates College, Lewiston, ME*
Bachelor of Arts in Physics, Fall 1998
Minor in German; Magna Cum Laude
Honor’s thesis: “Simultaneous Trapping of Cs and Rb in a Vapor-Cell MOT” directed by George A. Ruff

Education Abroad

- Mar. – June 1999** *Universität Wien/Central College Abroad, Vienna, Austria*
Coursework all conducted in German, including 20th century German literature, Austrian theater and the history and economics of the European Union.
- Jan. – Feb. 1999** *Goethe Institut, Murnau, Germany*
8-week intensive Germany language course.
- May 1996** *Deutsch-Insitut Tirol, Kitzbühel, Austria*
4-week intensive German language course.

RESEARCH EXPERIENCE

- 2004 – 2008** **Graduate Research Assistant**
University of Colorado at Boulder, Dept. of Electrical and Computer Engineering.
Developed a 3D direct-write lithography system for writing index structures into volume photopolymers. Developed an optical diffraction tomography system to measure index structures written in the photopolymer in order to characterize the response of the material at high intensities. Used these measurements to optimize the system to write uniform and tapered single mode waveguides and characterize the performance of these guides.
- 2001 – 2003** **Research Engineer I/II**
Coherent Technologies, Inc., Louisville, CO (now a part of Lockheed Martin Corporation)

Built and characterized tunable, solid state Cr:ZnSe laser systems and diode pumped Tm:YALO lasers. Actively stabilized infrared lasers for coherent lidar applications using Pound Drever Hall locking. Wrote and received SBIR Phase I research grant.

2000 – 2001

Professional Research Assistant

Displaytech, Inc., Longmont, CO

Created ellipsometry tests using LabVIEW to characterize the optical properties of liquid crystals for telecommunications applications. Designed a highly polarization sensitive optical system.

Jan. – May 2000

Graduate Research Assistant

University of Colorado at Boulder, Dept. of Physics

Built and tested a photorefractive electrooptic processor to create carrier-free RF modulation and demonstrated 70 dB of suppression.

COURSES TAUGHT AT AGNES SCOTT COLLEGE

- Modern Physics
- Introduction to Mechanics and Electricity Laboratory
- Introduction to Magnetism, Heat, Sound, and Light Laboratory
- Optics

AWARDS

- National Science Foundation IGERT Fellowship
- Best Student Paper Award at *Controlling Light with Light: Photorefractive Effects, Photosensitivity, Fiber Gratings, Photonic Materials and More* Conference, Oct. 14 – 16, 2007, Olympic Valley, CA.
- 2nd place, Colorado Photonics Industry Association (CPIA) student poster competition, Nov. 2004.
- Graduate Teaching Assistant Award Nomination, University of Colorado at Boulder, 2000.
- Hughes Summer Research Grant, Bates College, May-Aug. 1998.

PUBLICATIONS IN PEER REVIEWED JOURNALS

1. T. F. Scott, B. A. Kowalski, A. C. Sullivan, C. N. Bowman, R. R. McLeod, "Two-Color Single Photon Photoinitiation-Photoinhibition for Sub-Diffraction Photolithography," *Science* **324**, 913 – 917 (2009).
2. A. C. Sullivan and R. R. McLeod, "Tomographic reconstruction of weak, replicated index structures embedded in a volume," *Opt. Express* **15**, 14202-14212 (2007).
3. A. C. Sullivan, M. W. Grabowski, R. R. McLeod, "Three-dimensional direct-write lithography into photopolymer," *Appl. Opt.* **46**, 295–301 (2007).
4. D. Z. Anderson, V. B. Damaio, A. Sullivan, D. Popovic, Z. Popovic, S. Romisch, "-70 dB Optical Carrier Suppression by Two-Beam Coupling in Photorefractive Media," *Appl. Phys. B* **72**, 743–748 (2001).

PATENTS, PENDING

- R. R. McLeod, C. N. Bowman, T. F. Scott, A. C. Sullivan, "Diffraction Unlimited Photolithography," US patent filed Nov 14, 2008.

INVITED TALKS

- Georgia Institute of Technology School of Polymer, Textile and Fiber Engineering, Atlanta, GA (8/2009). "Fabrication and Characterization of 3D Photopolymer Waveguides."
- Optical Society of America Annual Meeting, *Frontiers in Optics*, Rochester, NY (10/2008). A. C. Sullivan, R. R. McLeod, and M. S. Kirchner, "3-D Micro-Optic Circuits in Holographic Photopolymers," OSA Technical Digest (CD) (Optical Society of America, 2008), paper SThC3.

EXTERNAL RESEARCH SUPPORT:

- **Co-Principal Investigator:** “Photo-Mask-Based Multi-Beam-Interference Lithography for Wafer-Scale-Integration of Photonic Crystal Devices,” NSF-ECCS 9/2009 – 8/2012; ; Total Award = \$300,000 to the Georgia Institute of Technology (PI: Thomas Gaylord, Department of Electrical Engineering), subaward to Carleton College = \$51,000.

CONFERENCE ABSTRACTS AND PROCEEDINGS:

1. T. F. Scott, B. A. Kowalski, A. C. Sullivan, C. N. Bowman, R. R. McLeod, “Lithography well below the diffraction limit inspired by STED microscopy,” SPIE 3D and Multi-Dimensional Microscopy: Image Acquisition and Processing 2009. **Invited Paper**
2. B. A. Kowalski, T. F. Scott, C. N. Bowman, A. C. Sullivan, and R. R. McLeod, “Exceeding the diffraction limit with single-photon polymerization and photo-induced termination,” in *Organic 3D Photonics Materials and Devices II*, Susanna Orlic, ed., SPIE **7053**, (2008).
3. E. D. Moore, A. C. Sullivan, and R. R. McLeod, “Three-dimensional waveguide arrays via projection lithography into a moving photopolymer,” in *Organic 3D Photonics Materials and Devices II*, Susanna Orlic, ed., SPIE **7053**, (2008).
4. R. R. McLeod and A. C. Sullivan, “Taper control of radially symmetric gradient-index waveguides in photopolymer,” in *Integrated Optics: Devices, Materials, and Technologies XII*, Christoph M. Greiner, Christoph A. Waechte, ed., SPIE 6896 (2008).
5. R. R. McLeod, M. S. Kirchner, and A. C. Sullivan, “3D Micro-Optic Circuits in Holographic Photopolymers,” in *Controlling Light with Light: Photorefractive Effects, Photosensitivity, Fiber Gratings, Photonic Materials and More*, Technical Digest (CD) (Optical Society of America, 2007), paper TuC2. Best Student Paper Award.
6. R. R. McLeod, M. S. Kirchner, K. Kamysiak, A. C. Sullivan, M. C. Cole, “3D waveguides with fiber couplers and 90 deg bends in holographic photopolymer,” in *Organic 3D Photonics Materials and Devices*, Susanna Orlic and Klaus Meerholz, ed., SPIE 6657, (2007).
7. A. C. Sullivan and R. R. McLeod, “3D Tapered Waveguides in Volume Photopolymers,” in *Integrated Photonics and Nanophotonics Research and Applications*, Technical Digest (CD) (Optical Society of America, 2007), paper ItuA7.
8. R.R. McLeod, M. W. Grabowski, M. R. Ayres and A. C. Sullivan, “Localized recording approaches and phase metrology for holographic storage,” in *Optical Data Storage*, Bernard Bell, Takeshi Shimano, ed., SPIE 6620 (2007). Invited Paper.
9. A. C. Sullivan, M. W. Grabowski, R. R. McLeod, “Impact of initiation species on index distribution in diffusion photopolymers” in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **6335**, (2006).
10. A. C. Sullivan, M. R. Ayres, R. R. McLeod, “Phase and Absorption Metrology for Thick Photopolymer Devices” in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **6335**, (2006).
11. C. D. Anderson, R. R. McLeod, M. W. Grabowski, and A. C. Sullivan, “Photopolymer Waveguide to Fiber Coupling via 3D Direct-Write Lithography,” in *Integrated Photonics Research and Applications/Nanophotonics*, Technical Digest (CD) (Optical Society of America, 2006), paper ItuD4.
12. M. W. Grabowski, A. C. Sullivan, and R. R. McLeod, “3D Direct-Write Waveguides in Diffusion Photopolymers,” in *Integrated Photonics Research and Applications/Nanophotonics*, Technical Digest (CD) (Optical Society of America, 2006), paper ItuD5.
13. A. C. Sullivan, R. R. McLeod, and M. W. Grabowski, "Tomographic Reconstruction of 3D Index Structures in Photopolymer," in *Integrated Photonics Research and Applications/Nanophotonics for Information Systems*, Technical Digest (Optical Society of America, 2005), paper ITuA3.
14. A. Zakel, G. J. Wagner, A. C. Sullivan, J. F. Wenzel, W. J. Alford, and T. J. Carrig, "High-Brightness, Rapidly-Tunable Cr:ZnSe Lasers," in *Advanced Solid-State Photonics*, Technical Digest (Optical Society of America, 2005), paper MD2.
15. R. R. McLeod, A. C. Sullivan, M. W. Grabowski, T. Scott, “Hybrid Integrated Optics in Volume Holographic Photopolymer” in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **5521**, 55–62 (2004).

16. R. R. McLeod, A. C. Sullivan, and M. Grabowski, "Direct-write waveguides in volume photopolymers," in *Optical Amplifiers and Their Applications/Integrated Photonics Research*, Technical Digest (CD) (Optical Society of America, 2004), paper JWB24.
17. A. C. Sullivan, G. J. Wagner, D. Gwin, R. C. Stoneman, and A. I. R. Malm, "High power Q-switched Tm:YALO lasers," in *Advanced Solid-State Photonics*, Technical Digest (Optical Society of America, 2004), paper WA7.
18. C.P.Hale, A.C.Sullivan, B.G.Tiemann, A.I.R.Malm, D.C.Sadighi, J.W.Hobbs, S.W.Henderson, P.Gatt, C.G.Garvin, "Frequency Stable and Broadly Tunable Master and Local Oscillators for Advanced Eyesafe Coherent Laser Radar Applications," 12th Coherent Laser Radar Conference, Bar Harbor, ME, June 15–20, 2003.
19. W. J. Alford, G. J. Wagner, A. C. Sullivan, J. A. Keene, T. J. Carrig, "High Power and Q-switched Cr:ZnSe Laser," OSA *Trends in Optics and Photonics* vol. 83, *Advanced Solid-State Photonics*, John J. Zayhowski, ed. (Optical Society of America, Washington, DC, 2003), 13–18.
20. D. Anderson, V. Damiao, S. Romisch, A. Sullivan, D. Popovic, and Z. Popovic, "Optical Carrier Suppression Using Two-Beam Coupling in Photorefractive Barium Titanate.," in *Photorefractive Effects, Materials, and Devices*, G. Salamo and A. Siahmakoun, eds., Vol. 62 of OSA Trends in Optics and Photonics (Optical Society of America, 2001), paper 94.
21. D. Z. Anderson, V. Damaio, E. Fotheringham, D. Popovic, S. Romisch, A. Sullivan, Z. Popovic, "Optically Smart Active Antenna Arrays", IEEE Int. Microwave Symp. 2000, Boston, MA.