

## Publications of Anand Gopinath

### Recent Books & Book Chapters

1. A. Gopinath: Voltage Measurement in the Scanning Electron Microscope, Advances in Electronics and Electron Physics, Ed. P. W. Hankes, Academic Press, Vol. 69, pp. 1-51, 1987.
2. A. Gopinath: Electron beam testing: An outline of Techniques, VLSI Electronics Microstructure Science, Eds: N. G. Euisprusch, P. Cohen, R.Singh, Vol. 21, pp. 479-521, 1989.
3. S. Prasad, H. Schumacher, A. Gopinath: High speed Devices, 2009, Cambridge University Press.
4. A. Gopinath, Analysis of Photonic Crystal Structures, in "Photonic Bandgap Structures: A Novel Technological Platform for Physical, Chemical and Biological Sensing," Editors: M. Pisco, A. Cusano, A. Cutolo, University of Sannio, Benevento, Italy, e-book, Bentham Science Publisher, 2012.

### Recent Journal Publications

1. R. Scaramozzino, A. Gopinath, R. Pregla, S. Helfert, Numerical techniques for modeling guided wave photonic devices, IEEE J. STQE, Vol. 6, no 1, pp. 150-162, 2000. (Invited Paper).
2. C. Laliew, S. Lovseth, X. Zhang, A. Gopinath: Linear optical coupler modulators, J. Lightwave Tech., Vol. 18, pp. 1244 -1249 , 2000.
3. William Berglund, Anand Gopinath, WKB analysis of optical waveguide bends, J. Lightwave Tech., Vol 18, pp. 1161-1166, 2000.
4. B. J. H. Stadler, A. Gopinath, "Magneto-optical garnet films made by reactive sputtering," IEEE Trans. Magn, vol. 36, pp. 3957-3961, 2000.
5. P. Koonath, Sangin Kim, Woon-Jo Cho, A. Gopinath, Polarization-insensitive optical amplifiers in AlInGaAs, IEEE Photonics Technology Letters, vol.13, no.8, Aug. 2001, pp.779-81.
6. T. Li, C. Laliew, A. Gopinath, An iterative transfer matrix inverse scattering technique for synthesis of co-directional couplers and filters, J. Quantum Electronics, vol. 38, pp.375-379, April 2002.
7. R. Schermer, W. Berglund, A. Gopinath, C. Ford, R. Ramberg, Optical Amplification at 1534 nm in Erbium-Doped Zirconia Waveguides, J. Quantum Electronics, vol. 39, pp. 154-159, 2003.
8. Y. E. Nesmelov, A. Gopinath, D. D. Thomas., Aqueous sample in an EPR cavity: sensitivity considerations, J Magn Reson, 167: 138-146, 2004.
9. K. H. Baek, A. Gopinath, Self assembled photonic crystal waveguides, IEEE Photonic Technology Letters, vol. 17, pp. 351-353, 2005.
10. J. T. Vaughan, L. DelaBarre, C. Snyder, J. Tian, C. Akgun, D. Shrivastava, W. Liu, C. Olson, G. Adriany, J. Strupp, P. Andersen, A. Gopinath, P.-F. van de Moortele, M. Garwood, K. Ugurbil, 9.4T Human MRI: Preliminary Results Magn. Reson. Med., Vol. 56, pp.1274-1282, 2006.
11. J. Kim, A. Gopinath, Simulation of Metamaterial Using Cubic High Dielectric Resonators in a Low Dielectric Background, Phys. Rev. B, Vol. 76, pp. 115126, 2007.

12. H.-S. Yoo, Yassine Beaubendir, A. Gopinath, Analysis of Open waveguides using finite element and boundary element method, IEEE J. Quantum Electronics, Vol. 44, 7, pp.676-679, 2008.
13. Hyongsuk Yoo, A. Gopinath, Analysis of open dielectric waveguides using the finite-element penalty method, Optics Letters, v 33, n 18, pp. 2068-70, 15 Sept. 2008.
14. Hyongsuk Yoo, Anand Gopinath, Pseudoinverse method for modal solutions of open dielectric waveguides, Optics Letters, vol. 34, no. 8, 1282-1284, 2009.
15. S. Sivaramakrishnan, Anand Gopinath, Rajeech Rajamani, Development of a wireless angle sensor based on the directional radiation pattern of antennas, Measurement Science and Technology, vol. 20, no. 6, p 065202 (12 pp.), June 2009
16. Jaesang Oh, A. Gopinath, A coplanar strip slow wave structure for the optical directional coupler modulators, IEEE Microwave and Wireless Components Letters, v 20, n 1, p 7-9, Jan. 2010.
17. Heather Orser, Anand Gopinath, A 20Gs/s 1.2V 0.13 $\mu$ m CMOS switched cascode track and hold amplifier, IEEE Trans. Circuits and Systems- Express Briefs, vol. 57, no. 7, pp.512-515, 2010.
18. Jaewan Kim, Hyong-Suk Yoo, Anand Gopinath, Simulations and experiments on higher resonant modes of cubic high dielectric resonator metamaterial, Electronics Letters, v 46, n 24, p 1590-1, 25 Nov. 2010
19. Sung-Min Sohn, J. T. Vaughan, A. Gopinath, An interdigitated split-ring resonator for metamaterials, Microwave and Optical Technology Letters, v 53, n 1, p 174-7, Jan. 2011.
20. A. Omar, R. Caverly, W. Doherty, R. Watkins, A. Gopinath, J. T. Vaughan, A Microwave Engineer's View of MRI, IEEE Microwave Magazine, June 2011.
21. Hyongsuk Yoo, A. Gopinath, J. T. Vaughan, RF  $B_1$  Field Calculation with Transmission Line Resonator Analysis for High Field Magnetic Resonance Systems, Antennas and Wireless Propagation Letters, v 10, p 592-5, 2011.
22. C. Olson, Hyongsuk Yoo, L. Delabarre, J. T. Vaughan, A. Gopinath, RF  $B_1$  field localization through convex optimization. Microwave and Optical Technology Letters, v 54, n 1, p 31-7, Jan. 2012.
23. Hyongsuk Yoo, Anand Gopinath, J. Thomas Vaughan, A Method to Localize RF  $B_1$  Field in High Magnetic Field Magnetic Resonance Imaging Systems, IEEE Trans. Bioengineering, vol. 59, no. 12, 3353-3370, 2012.

### **Recent Conference papers (refereed)**

1. Barry Koch, Xiaobo Zhang, Dan Olson, James Leger, Anand Gopinath, Single Mode Vertical Cavity Laser, Conference on Lasers and ElectroOptics (CLEO) 2000, May 8-12, 2000, San Francisco, CA.
2. William Berglund, Benjamin Ellerbusch, Anand Gopinath, Carol Ford, Randy Ramberg, A. S. E. alumina waveguide source at 1530 nm, Conference on Lasers and ElectroOptics (CLEO) 2000, May 8-12, 2000, San Francisco, CA.

3. C. Laliew, X. Zhang, A. Gopinath, Linearized optical directional-coupler modulators for analog Rf/Microwave transmission systems, IEEE International Microwave Symposium, pp. 1829-1832, Boston, MA, June 2000
4. Prakash Koonath, Anand Gopinath: GaAs Polarization convertor, Integrated Photonics Research Meeting Technical Digest, pp. 171-173, Quebec City, Canada, July 2000, OSA.
5. William Berglund, Ross Schermer, Woon Jo Cho, Anand Gopinath, Carol Ford, Randy Ramberg: Rare earth doped planar waveguides in Zirconia, Integrated Photonics Research Meeting Technical Digest, pp. 302-303, Quebec City, Canada, July 2000, OSA.
6. Prakash Koonath, Sangin Kim, Woon-Jo Cho, Anand Gopinath: Polarization insensitive semiconductor optical amplifiers in AlInGaAs, Optical Fiber Communication Conference Technical Digest, paper WDD-70, Anaheim, CA, March 2001, OSA.
7. D. Olson, P. Koonath, T. Yeh, Z. Qian, D. Wang, R. F. Drayton, J. Sivertsen, A. Gopinath, "High frequency measurements of magnetic films," Electrochem. Soc. Proc. 2000-29, pp. 404-406, 2000.
8. R. Schermer, W. Berglund, A. Gopinath, an investigation into a mesa guide, 2001 Integrated Photonics Research Meeting, Monterey, CA, June 2001.
9. A. Gopinath, C. Laliew, T. Li, K.-H. Baek and R. Schermer, Synthesis of the Design of Co-directional Couplers (Invited Paper), Electrochemical Society Centennial Meeting, First International Symposium on Integrated Optoelectronics Meeting Abstracts, Centennial Meeting, May 12-17, 2002, Philadelphia, PA, paper no. 658.
10. T. Li, K. H. Baek, A. Gopinath, C. Laliew, Dispersion Slope Compensation with Co-directional Optical Couplers, 2002 Integrated Photonic Research Meeting, Vancouver, BC, Canada, June 2002.
11. K. H. Baek, C. Laliew, A. Gopinath, The wavelength dependency of a linearized codirectional-coupled electrooptic modulator with Pi-phase shifters, 2002 Integrated Photonic Research Meeting, Vancouver, BC, Canada, June 2002.
12. R. Schermer, W. Berglund, A. Gopinath, Judd-Ofelt parameters of Erbium doped zirconia waveguides, CLEO 2002, Long Beach CA, May 2002.
13. C. Laliew, K. H. Baek, A. Gopinath, Low switching voltage synthesized coupler modulator, CLEO 2002, Long Beach, CA, May 2002.
14. R. Schermer, A. Gopinath, Novel dielectric waveguide formed by deposition onto a patterned substrate, 2003 Integrated Photonics Research Meeting Technical Abstracts, Washington DC, paper ITH9, June 2003, OSA.
15. ByunghooJung, Anand Gopinath, Ramesh Harjani, A novel noise optimization technique for radio frequency low noise amplifiers, IEEE International Symposium on Circuits and Systems, 2003.
16. R. Schermer, A. Gopinath, Graphical design of directional coupler devices, Integrated Photonic Research Meeting, San Francisco, CA, June 2004.
17. Jaesang Oh, Ross Schermer, Anand Gopinath, Synthesis of Optical Directional Coupler modulators with linear response, IEEE 2004 International Microwave Symposium, Fort Worth, TX, June, 2004.
18. A. Gopinath, R. Schermer, J. Oh, Linear response optical modulators, Asia-Pacific Microwave Conference, New Delhi, India, December 2004, (Invited).

19. K. H. Baek, C. Barsi, A. Gopinath, Self assembled opal and inverse opals as photonic band gap structures with waveguide defect, NSF Indo-US Workshop on Nanotechnology: Issues in Interdisciplinary Research and Education, August 11-13, 2004, Bangalore, India (Invited)
20. K. H. Baek, A. Gopinath, Self-Assembled 3-Dimensional Photonic Crystal Waveguides, Material Research Society, Spring 2004 Meeting, San Francisco, CA, April 2004 (invited Paper)
21. A. Gopinath, J. Oh, R. Schermer, Synthesis techniques for directional coupler as modulator and filter, Integrated Photonic Research Meeting, San Francisco, CA, June 2004, Invited paper.
22. Jang-Uk Lee, Kang-Hyun Baek, Chris Olson, Dong Myong Kim, Anand Gopinath, Optical Waveguide Embedded in Silicon Inverse Opal, PIERS conference, Cambridge, MA, March 26-29, 2006, (Invited paper).
23. Jang-Uk Lee, Kang-Hyun Baek, Chris Olson, Dong Myong Kim, Anand Gopinath, Waveguide Embedded in Silicon Inverse Opal, Integrated Photonics Research Meeting, April 24-28, 2006.
24. Jaewon Kim, Anand Gopinath, A novel metamaterial structure with high dielectric resonators, Photonic Metamaterials: From random to periodic, June 5-8, 2006, paper WD27, O.S.A..
25. J. Kim, A. Gopinath, Application of cubic high dielectric resonator to antennas, 2007 IEEE Antennas & Prop. Symposium, Hawaii, June, p 2349-52, 2007.
26. C. C. Olson, L. DelaBarre, J. T. Vaughan, A. Gopinath,  $B_1^+$  Region of interest localization through convex optimization, ISMRM Conference, Poster presentation, Berlin, May 2007.
27. Hyongsuk Yoo, Anand Gopinath, Analysis of dielectric waveguide with open boundaries, 2008 PIERS Cambridge, MA July, 2008 (Invited paper)
28. H.-S. Yoo, A. Gopinath, Analysis of open waveguides using finite element and boundary element method, 2008 IPNRA Meeting, Boston, MA, July 2008.
29. K. H. Baek, A. Gopinath, Si-waveguide embedded in self-assembled photonic crystal, First Mediterranean Photonics conference, Ischia, Italy, June 25-29 June, 2008 (Invited Paper).
30. Hyongsuk Yoo, Anand Gopinath, Analysis of dielectric waveguide with open boundaries, 2008 PIERS Cambridge, MA July, 2008 (Invited paper)
31. H.-S. Yoo, A. Gopinath, Analysis of open waveguides using finite element and boundary element method, 2008 IPNRA Meeting, Boston, MA, July 2008.
32. Jaewon Kim, Anand Gopinath, Simulations and Experiments with Metamaterial Flat Antenna Lens Using Cubic High Dielectric Resonators, IEEE 2009 International Workshop on Antenna Technology : "Small Antennas and Novel Metamaterials," Santa Monica, CA, March 2-4, p. 4, 2009.
33. Hyongsuk Yoo, J. T. Vaughan, A. Gopinath, Convex optimization with iterations for RF  $B_1$  field localization, 2009 Applied Computational Electromagnetics Society Meeting, Monterey CA, March 9-11, 2009 (Invited paper).
34. Hyongsuk Yoo, A. Gopinath, J. T. Vaughan Convex optimization for RF  $B_1$  field localization, 2009 ISMRM Meeting, Hawaii April 2009.

35. Can Akgun, Lance DelaBarre, Carl Snyder, Gregor Adriany, Kamil Ugurbil, Anand Gopinath, John Thomas Vaughan, Alternating Impedance Element for 7T Multi-Channel Transceiver Coil, 2009 ISMRM Meeting, Hawaii April 2009.
36. Can Akgun, Lance DelaBarre, Sung-Min Sohn, Carl Snyder, Gregor Adriany, Kamil Ugurbil, John Thomas Vaughan, Anand Gopinath, Novel multi-channel transmission coil, for high field magnetic resonance imaging, IEEE 2009 International Microwave Symposium, June 2009, Boston, MA.
37. Desalegn B. Bereka, Ramesh Harjani, Anand Gopinath and Robert Sainati, A 60GHz Integrated Rectangular Loop Patch Antenna For High speed Applications, 2009 URSI and Radio Science Meeting with the IEEE APS Symposium, Charlottesville, South Carolina, June 2009.
38. Can Eyup Akgun, Lance DelaBarre, Carl Jason Snyder, Sung-Min Sohn, Gregor Adriany, Kamil Ugurbil, Anand Gopinath, John Thomas Vaughan, Alternating Impedance Multi-Channel Transmission Line Resonators for High Field Magnetic Resonance Imaging, IEEE 2010 International Microwave Symposium, Anaheim, CA, May 2010.
39. Hyongsuk Yoo, Anand Gopinath, J. Thomas Vaughan, A Method to Control Non-uniformity RF B1 Field for High Field Magnetic Resonance Imaging, IEEE 2010 International Microwave Symposium, Anaheim, CA, May 2010.
40. H. Yoo, A. Gopinath, and T. Vaughan, Rapid B1 field calculation using integral equations for RF shimming, 2010 ISMRM Meeting, Stockholm, May 2010.
41. Can Akgun, Lance DelaBarre, Carl Snyder, Gregor Adriany, Kamil Ugurbil, Anand Gopinath, John Thomas Vaughan, Alternating Impedance Element for 7T Multi-Channel Transceive Coil, 2010 ISMRM Meeting, Stockholm, May 2010.
42. Can Akgun, Lance Delabarre, Hyongsuk Yoo, Carl Snyder, Sung-Min Sohn, Gregor Adriany, P-F Van De Moortele, Anand Gopinath, Kamil Ugurbil, and J. Thomas Vaughan, Stepped impedance resonators for high field MRI, International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, Canada, May 7 13, 2011.
43. Can Akgun, Hyongsuk Yoo Lance Delabarre, Carl Snyder, Gregor Adriany, P-F Van De Moortele, Anand Gopinath, Kamil Ugurbil, and J. Thomas Vaughan, Novel 24 element volume head coil for high field MRI, International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, Canada, May 7 13, 2011.
44. S-M. Sohn, A. Gopinath, J. Thomas Vaughan, Electrically auto-tuned RF coil design, International Society for Magnetic Resonance in Medicine (ISMRM), Montreal, Canada, May 7 13, 2011.
45. S-M. Sohn, A. Gopinath, J. Thomas Vaughan, Auto-tuning of The RF Transmission Line Coil for High-Fields Magnetic Resonance Imaging (MRI) Systems, IEEE 2011 International Microwave Symposium, Baltimore, MD, June 5-11, 2011.
46. D. Bereka, A. Gopinath, R. Sainati, " Design of a 60GHz High Efficiency Virtual Loop Antenna on Low Resistivity Silicon, " 2011 IEEE International Symposium on Antennas and Propagation and UNSC/URSI Meeting , Spokane, Washington, pp. 891-894, USA 2011.
47. A. Gopinath, E. Ebbini, J. T. Vaughan, Digital Beam Forming in the MRI, International Society for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia, May 5-11, 2012.

48. S-M Sohn, L. Delabarre, J. T. Vaughan, A. Gopinath, RF Multi-Channel Head Coil Design with Improved B1+ Field Uniformity for High-Field MRI Systems, IEEE 2012 International Microwave Symposium, Montreal, Canada, June 5-7, 2012.
49. S-M Sohn, L. Delabarre, J. T. Vaughan, A. Gopinath, Hybrid Phi-matching technique for RF coil of MRI system, IEEE 2012 International Microwave Symposium, Montreal, Canada, June 5-7, 2012.
50. C. Akgun, L. Delbarre, C. Snyder, A. Gopinath, J. T. Vaughan, Optimizing TEM Transceiver Elements at 7 Tesla, International Society for Magnetic Resonance in Medicine (ISMRM), Melbourne, Australia, May 5-11, 2012.
51. S-M Sohn, L. DelaBarre, A. Gopinath, J. T. Vaughan, RF coil design with automatic tuning and matching, International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting, Salt Lake City, UT, April 22-26, 2013.
52. E. Ebbini, A. Gopinath, J. T. Vaughan, L. Delbarre, Digital Beamforming in the MRI, International Society for Magnetic Resonance in Medicine (ISMRM) Annual Meeting, Salt Lake City, UT, April 22-26, 2013.
53. S-M Sohn, L. DelaBarre, J. T. Vaughan, A. Gopinath, 8-Channel RF Head Coil of MRI with Automatic Tuning and Matching, IEEE 2013 International Microwave Symposium, Seattle, WA, June 2013.

## Patents

1. A. Gopinath, Optical fiber amplifier, US Patent 5,805,332, September 8, 1998.
2. A. Gopinath, K. L. Johnson, C. M. Ford, R. J. Ramberg, Waveguide optical amplifier, US Patent 5,847,865, December 8, 1998.
3. A. Gopinath, Vertical cavity surface emitting laser with single mode confinement, US Patent 6,515,305, February 4, 2003.
4. A. Gopinath, Vertical cavity surface emitting laser, US Patent 6,542,527, April 1, 2003.
5. K. H. Baek, A. Gopinath, A. H. Christmann, Self assembled three-dimensional photonic crystal, United States Patent 7,106,938, September 12, 2006.
6. Anand Gopinath, Jaesang Oh, Ross Scheremr, Optical coupler, provisional patent application US 2007/0211984 A1, September 13, 2007, utility patent not filed and since abandoned.
7. Anand Gopinath, Optical Fiber Communication Link, application no. 11/361,019, filed, 2/23/2006, allowed 3/19/2010.
8. Sung Min Sohn, A. Gopinath, J. T. Vaughan, L. DelaBarre: Auto-tuning of TEM RF Coils for MRI, Utility filed April 2013
9. A. Gopinath, Emad Ebbini, J. T. Vaughan, L. DelaBarre, Digital beam forming in the MRI, Utility filed April 2013