

Uday K. Chettiar

Electrical and Systems Engineering, University of Pennsylvania
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EDUCATION

PhD	Purdue University , ECE West Lafayette, Indiana, USA	GPA: 4.0/4.0	Dec 2008
MS	Purdue University , ECE West Lafayette, Indiana, USA	GPA: 4.0/4.0	May 2008
BTech	Indian Institute of Technology Bombay , EE Mumbai, India	GPA: 9.22/10.0	Aug 1999

AWARDS AND HONORS

- Finalist for the student presentation award at Frontiers in Optics conference, 2007
- NASA Nano 50 Award for the top 50 nanotechnologies, 2006
- Benjamin Franklin-Meissner Fellowship at Purdue University, 2003
- Ranked 168 (top 0.11%) among 150,000 in the joint entrance examination for Indian Institute of Technology, 1999
- Gold medalist in the Indian National Physics Olympiad, 1999

EXPERIENCE

- 02/2009-
current **Post Doctoral Research Associate**, Electrical and Systems Engineering, University of Pennsylvania. Supervisor: Prof. Nader Engheta.
- Worked on several projects in nanooptics and plasmonics with focus on numerical analysis and optimization.
- 08/2003-
02/2009 **Graduate Student Researcher**, School of Electrical and Computer Engineering, Purdue University. Advisor: Prof. Vladimir M. Shalaev.
- Developed simulation tools based on parallelized Finite Difference Time Domain (FDTD) method and Spatial Harmonic Analysis to simulate optical metamaterials.
 - Provided theoretical and modeling support for the world's first experimental demonstration of negative index of refraction at optical wavelengths.
 - Provided theoretical and modeling support for the world's first optical magnetic material across the whole visible spectrum.
 - Demonstrated negative index of refraction for light at the shortest wavelength (710 nm) till date (Aug 2009).
 - My work was reported by numerous media outlets including two television news shows. I was also interviewed on WTRC news.
- 05/2002-
05/2003 **Summer Internship**, Society for Applied Microwave Electronics and Research (SAMEER), Mumbai, India (Supervisor: Dr. Anuj Bhatnagar).
- Developed a setup with accompanying software for the characterization of optical fibers through the mode field distribution.
- Undergraduate Student Researcher**, Department of Electrical Engineering, Indian Institute of Technology Bombay, India (Advisor: Prof. R. K. Shevgaonkar)
- Analyzed and provided a theoretical model for pulse propagation through a nonlinear direction coupler using coupled mode analysis and nonlinear Schrodinger equation (NLSE).

INVENTIONS

Systems and Method and Apparatus for Optical Cloaking with Non-Magnetic Metamaterials, W. Cai, Uday K. Chettiar, A. V. Kildishev, and V. M. Shalaev, Provisional US patent filed, 12264/110 (64405.P1.US), November 2006.

SKILLS

- **Programming Skills:** C, C++, Parallel computing (MPI, PBS), Fortran.
- **Software Packages:** Matlab, Mathematica, Comsol.
- **Fabrication:** UV Lithography.

PROFESSIONAL SERVICE

- Referee for the following journals: Physical Review Letters, Journal of Optical Society of America B, Optics Letters and Applied Physics Letters.
- Member of Optical Society of America (OSA).

- Coordinator for the annual technology festival (Techfest) at IIT Bombay, Feb 2001.
- Organizer for the annual cultural festival (Mood Indigo) at IIT Bombay, Dec 1999.

PUBLICATIONS AND PRESENTATIONS (reverse chronological order)

Journal Papers

- [14] Uday K. Chettiar, S. Xiao, A. V. Kildishev, W. Cai, H. K. Yuan, V. P. Drachev, and V. M. Shalaev, "Optical metamagnetism and negative index metamaterials," *Materials Research Society Bulletin*, vol. 33, 2008 (**Invited**).
- [13] W. Cai, Uday K. Chettiar, A. V. Kildishev, and V. M. Shalaev, "Designs for optical cloaking with high-order transformations," *Optics Express*, vol. 16, 2008.
- [12] V. P. Drachev, Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, and V. M. Shalaev, "The Ag dielectric function in plasmonic metamaterials," *Optics Express*, vol. 16, 2008.
- [11] A. V. Kildishev, Uday K. Chettiar, Z. Liu, V. M. Shalaev, D. H. Kwon, Z. Bayraktar, and D. H. Werner, "Stochastic optimization of low-loss optical negative-index metamaterial," *Journal of the Optical Society of America B*, vol. 24, 2007.
- [10] W. Cai, Uday K. Chettiar, A. V. Kildishev, V. M. Shalaev, and G. W. Milton, "Nonmagnetic cloak with minimized scattering," *Applied Physics Letters*, vol. 91, 2007.
- [9] Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, S. Xiao, V. P. Drachev, and V. M. Shalaev, "Dual-band negative index metamaterial: double negative at 813nm and single negative at 772nm," *Optics Letters*, vol. 32, 2007.
- [8] W. Cai, Uday K. Chettiar, A. V. Kildishev, and V. M. Shalaev, "Optical cloaking with metamaterials," *Nature Photonics*, vol. 1, 2007.
- [7] W. Cai, Uday K. Chettiar, H. K. Yuan, V. C. de Silva, A. V. Kildishev, V. P. Drachev, and V. M. Shalaev, "Metamagnetics with rainbow colors," *Optics Express*, vol. 15, 2007.
- [6] A. V. Kildishev and Uday K. Chettiar, "Cascading optical negative index metamaterials," *Applied Computations Electromagnetics Society Journal*, vol. 22, 2007.
- [5] H. K. Yuan, Uday K. Chettiar, W. Cai, A. V. Kildishev, A. Boltasseva, V. P. Drachev, and V. M. Shalaev, "A negative permeability material at red light," *Optics Express*, vol. 15, 2007.
- [4] Uday K. Chettiar, A. V. Kildishev, T. A. Klar, and V. M. Shalaev, "Negative index metamaterial combining magnetic resonators with metal films," *Optics Express*, vol. 14, 2006.
- [3] A. V. Kildishev, W. Cai, Uday K. Chettiar, H. K. Yuan, A. K. Sarychev, V. P. Drachev, and V. M. Shalaev, "Negative refractive index in optics of metal-dielectric composites," *Journal of the Optical Society of America B*, vol. 23, 2006.
- [2] V. P. Drachev, W. Cai, Uday Chettiar, H. K. Yuan, A. K. Sarychev, A. V. Kildishev, G. Klimeck, and V. M. Shalaev, "Experimental verification of an optical negative-index material," *Laser Physics Letters*, vol. 3, 2006.
- [1] V. M. Shalaev, W. Cai, Uday K. Chettiar, H. K. Yuan, A. K. Sarychev, V. P. Drachev, and A. V. Kildishev, "Negative index of refraction in optical metamaterials," *Optics Letters*, vol. 30, 2005. **Cited over 363 times as of July 2009 (Web of Science)**

Selected Conference Presentations (as presenter)

- [7] A. V. Kildishev, Uday K. Chettiar, V. P. Drachev, and V. M. Shalaev, "Numerical simulations of nanostructured optical metamaterials: challenges and trends," SPIE Optics+Photonics, San Diego, CA, August 10-14, 2008 (**Invited**).
- [6] Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, S. Xiao, V. P. Drachev, and V. M. Shalaev, "Optical double negative metamaterial at 813 nm," Optical Society of America (OSA) Frontiers in Optics, San Jose, CA, September 16-20, 2007.
- [5] Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, S. Xiao, V. P. Drachev, and V. M. Shalaev, "Double negative index metamaterial: simultaneous negative permeability and permittivity at 813 nm," OSA Topical Meeting on Photonic Metamaterials, Jackson Hole, WY, June 4-7, 2007.
- [4] Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, V. P. Drachev, and V. M. Shalaev, "Negative metamaterial for two distinct polarizations: double negative at 813 nm and single negative at 770 nm," Conference on Lasers and Electro-optics (CLEO/QELS), Baltimore, MD, May 6-11, 2007.
- [3] Uday K. Chettiar, A. V. Kildishev, and V. M. Shalaev, "Angular dependence in optical negative index materials," IEEE AP-S International Symposium, Albuquerque, NM, July 9-14, 2006 (**Invited**).
- [2] Uday K. Chettiar, A. V. Kildishev, T. A. Klar, H. K. Yuan, W. Cai, A. K. Sarychev, V. P. Drachev, and V. M. Shalaev, "From low-loss to lossless optical negative-index materials," Conference on Lasers and Electro-optics (CLEO/QELS), Long Beach, CA, May 21-26, 2006.
- [1] Uday K. Chettiar, A. V. Kildishev, H. K. Yuan, W. Cai, A. K. Sarychev, V. P. Drachev, and V. M. Shalaev, "Simulation of optical negative index materials," Optical Society of America (OSA) Frontiers in Optics, Tucson, AZ, October 17-20, 2005.

REFERENCES

Available upon request