

CURRICULUM VITAE

Koray AYDIN

Thomas J. Watson Laboratory of
Applied Physics
California Institute of Technology
MC 128-95, Pasadena, CA 91125

phone: (626) 395-3826
fax: (626) 844-9320
e-mail: koray@caltech.edu
web: <http://www.its.caltech.edu/~koray>

EDUCATION:

- Ph.D.** Physics, 2008, Bilkent University, Ankara, Turkey.
- M.S.** Physics, 2004, Bilkent University, Ankara, Turkey.
- B.S.** Physics, 2002, Bilkent University, Ankara, Turkey.

HONORS and AWARDS:

- SPIE Educational Scholarship, 2007.
- Scientific Travel Grant from “The Scientific and Technological Research Council of Turkey (TUBITAK)”, 2005, 2006 and 2007.
- Bilkent University Board of Trustees scholarship. Awarded for graduate study, 2002-present.
- Bilkent University Board of Trustees scholarship. Awarded for undergraduate study, 1998-2002.

PROFESSIONAL EXPERIENCE:

- 2008-present **Postdoctoral Researcher**, Applied Physics, California Institute of Technology
- 2004-2008 **Research Assistant**, Nanotechnology Research Center, Bilkent University.
- 2002-2004 **Research Assistant**, Department of Physics, Bilkent University.
- 2002-2008 **Teaching Assistant**, Department of Physics, Bilkent University.

MEMBERSHIPS:

- Member, 2003-present Optical Society of America (OSA)
- Member, 2003-present American Physical Society (APS)
- Member, 2003-present Institute of Electrical and Electronics Engineers (IEEE)
- Member, 2007-present The International Society for Optical Engineering (SPIE)

PROFESSIONAL ACTIVITIES:

Reviewer for numerous scientific journals in the field of metamaterials, plasmonics and photonic crystals: Applied Physics Letters, Optics Letters, Optics Express, Journal of Applied Physics, Journal of Optical Society of America A and B, New Journal of Physics, Journal of Physics B and D, Journal of Optics A, and Optics Communications

RESEARCH INTERESTS:

- Active optical metamaterials
- Thin film plasmonic absorbers
- Plasmonics and metamaterials for photovoltaics
- Active nanophotonic devices based on phase-transition materials.
- High efficiency III-V heterostructure solar cells.
- Device modeling and physics of thin film multi-junction solar cells.
- InP wafer bonding to silicon substrates.

RESEARCH SKILLS:

Characterization: Spectral ellipsometry, infrared spectroscopy, network analyzer, spectrum analyzer, Photoluminescence (PL) measurements.

Fabrication: Electron-beam lithography, sputtering, thermal and e-beam evaporation, Micro-lithography techniques, reactive ion etching, e-beam evaporator, PECVD.

Simulation: Lumerical, CST Microwave Studio, AFORS-Het, Sentaurus

PUBLICATIONS in SCI-INDEX JOURNALS:

- 40) Koray Aydin, A. O. Cakmak, L. Sahin, Z. Li, F. Bilotti, L. Vegni, and E. Ozbay, "Split-ring-resonator-coupled enhanced transmission through a single subwavelength aperture" *Phys. Rev. Lett* **102**, 013904 (2009).
- 39) R. S. Penciu, K. Aydin, M. Kafesaki, Th. Koschny, E. Ozbay, E. N. Economou and C. M. Soukoulis "Multi-gap individual and coupled split-ring resonator structures" *Optics Express* **16**, 18131 (2008).
- 38) Koray Aydin, Z. Li, L. Sahin, and E. Ozbay, "Negative phase advance in polarization independent, multi-layer negative index metamaterials" *Optics Express* **16**, 8835 (2008).
- 37) Zhaofeng Li, Koray Aydin and Ekmel Ozbay, "Wide bandwidth directional beaming via waveguide ports in photonic crystals" *J. Phys. D.* **41**, 155115 (2008).
- 36) Ekmel Ozbay, Z. Li and Koray Aydin, "Super-resolution imaging by one dimensional, microwave left-handed metamaterials with an effective negative index" *J. Phys. Cond. Matt.* **20**, 304216 (2008).

- 35) B. Butun*, K. Aydin*, E. Ulker, S. Cheylan, G. Badenes, M. Forster, U. Scherf, and E. Ozbay, "A hybrid light source with integrated inorganic light-emitting diode and organic polymer distributed feedback grating" *Nanotechnology* **19**, 195202 (2008). (*equal contribution)
- 34) E. Ozbay and K. Aydin, "Negative refraction and imaging beyond the diffraction limit by a two-dimensional left-handed metamaterial" *Photon. Nanostr.: Fundam. Appl.* **6**, 108 (2008). [INVITED]
- 33) K. Aydin, Z. Li, S. Bilge, and E. Ozbay, "Experimental and numerical study of omega type bianisotropic metamaterials combined with a negative permittivity medium" *Photon. Nanostr.: Fundam. Appl.* **6**, 116 (2008).
- 32) F. Bilotti, A. Toscano, L. Vegni, K. Aydin, K. B. Alici, and E. Ozbay, "Equivalent circuit models for the design of metamaterials based on artificial magnetic inclusions" *IEEE Trans. Microw. Theory Tech.* **55**, 2865 (2007).
- 31) E. Ozbay, and K. Aydin, "Experimental study of subwavelength focusing by left-handed metamaterials with negative refractive index" *J. Nanophotonics* **1**, 011695 (2007).
- 30) Koray Aydin, Zhaofeng Li, M. Hudlicka, S. A. Tretyakov, Ekmel Ozbay, "Transmission characteristics of bianisotropic metamaterials based on omega shaped metallic inclusions" *New J. Phys.* **9**, 326 (2007).
- 29) Zhaofeng Li, Koray Aydin, and Ekmel Ozbay, "Highly directional emission from photonic crystals with a wide bandwidth" *Appl. Phys. Lett.* **91**, 121105 (2007).
- 28) E. Ozbay, K. Guven and K. Aydin, "Metamaterials with negative permeability and negative refractive index: Experiments and simulations" *J. Opt. A.: Pure Appl. Opt.* **9**, S301 (2007). [INVITED]
- 27) Koray Aydin, I. Bulu and E. Ozbay, "Subwavelength resolution with a negative-index metamaterial superlens" *Appl. Phys. Lett.* **90**, 254102 (2007).
- 26) Koray Aydin, and E. Ozbay, "Left-handed metamaterial based superlens for subwavelength imaging of electromagnetic waves" *Appl. Phys. A: Mat. Sci. Proc.* **87**, 137 (2007).
- 25) E. Ozbay, K. Aydin, I. Bulu, and K. Guven, "Negative refraction, subwavelength focusing and beam formation by photonic crystals" *J. Phys. D: Appl. Phys.* **40**, 2652 (2007).
- 24) K. Aydin, and E. Ozbay, "Experimental and numerical analyses of the resonances of split-ring resonators" *Phys. Stat. Sol. B.* **244**, 1197 (2007).
- 23) I. Bulu, H. Caglayan, K. Aydin, and E. Ozbay, "Study of the field emitted by a source placed inside a two dimensional left-handed metamaterial" *Opt. Lett.* **32**, 850 (2007).
- 22) K. Aydin, and E. Ozbay, "Experimental investigation of reflection characteristics of left-handed metamaterials in free space" *IET Microw. Antennas Propag.* **1**, 89 (2007).
- 21) K. Aydin, and E. Ozbay, "Capacitor-loaded split ring resonators as tunable metamaterial components" *J. Appl. Phys.* **101**, 024911 (2007).
- 20) Koray Aydin, I. Bulu, and E. Ozbay, "Electromagnetic wave focusing from sources inside a two-dimensional left-handed material superlens" *New J. Phys.* **8**, 221 (2006).
- 19) Koray Aydin, I. Bulu and E. Ozbay, "Verification of impedance matching at the surface of left-handed materials," *Microw. Opt. Tech. Lett.* **48**, 2548 (2006).

- 18) Koray Aydin, and E. Ozbay, "Identifying the magnetic response of split-ring resonators at microwave frequencies" *Opto-Electron. Rev.* **14**, 193 (2006).
- 17) E. Ozbay, I. Bulu, K. Guven, H. Caglayan, and K. Aydin, "Observation of negative refraction and focusing in two-dimensional photonic crystals", *Japanese J. Appl. Phys.* **45**, 6064 (2006). [INVITED]
- 16) M. Gokkavas, K. Guven, I. Bulu, K. Aydin, R. S. Penciu, M. Kafesaki, C. M. Soukoulis, and E. Ozbay, "Experimental demonstration of a left-handed metamaterial operating at 100 GHz," *Phys. Rev. B* **73**, 193103 (2006).
- 15) Koray Aydin, and E. Ozbay, "Negative refraction through an impedance matched left-handed metamaterial slab," *J. Opt. Soc. Am. B* **23**, 415 (2006).
- 14) K. Guven, K. Aydin, and E. Ozbay "Experimental analysis of true left-handed behavior and transmission properties of composite metamaterials", *Photonics and Nanostruct. - Fund. Appl.* **3**, 75 (2005).
- 13) Koray Aydin, I. Bulu and E. Ozbay, "Focusing of electromagnetic waves by a left-handed metamaterial flat lens", *Opt. Express* **13**, 8753 (2005).
- 12) I. Bulu, H. Caglayan, K. Aydin, and E. Ozbay, "Compact size highly directive antennas based on SRR metamaterial medium," *New J. Phys.* **7**, 223 (2005).
- 11) Koray Aydin, I. Bulu, K. Guven, M. Kafesaki, C. M. Soukoulis and E. Ozbay, "Investigation of magnetic resonances for different split-ring resonator parameters and designs," *New J. Phys.* **7**, 168 (2005).
- 10) Koray Aydin, K. Guven, C. M. Soukoulis and E. Ozbay, "Observation of negative refraction and negative phase velocity in left-handed metamaterials", *Appl. Phys. Lett.* **86**, 124102 (2005).
- 9) E. Ozbay, I. Bulu, K. Aydin, H. Caglayan, K. Guven, and Boratay K. Alici, "Highly directive radiation and negative refraction using photonic crystals," *Laser Phys.* **15**, 217 (2005). [INVITED]
- 8) Koray Aydin, K. Guven, N. Katsarakis, C. M. Soukoulis, and E. Ozbay, "Effect of disorder on magnetic resonance band gap of split-ring resonator structures," *Opt. Express* **12**, 5896 (2004).
- 7) Koray Aydin, K. Guven, L. Zhang, M. Kafesaki, C. M. Soukoulis, and E. Ozbay, "Experimental observation of true left-handed transmission peak in metamaterials," *Opt. Lett.* **29**, 2623 (2004).
- 6) K. Guven, K. Aydin, K. B. Alici, C. M. Soukoulis, and E. Ozbay, "Spectral negative refraction and point focusing analysis of a two-dimensional left-handed photonic crystal lens," *Phys. Rev. B.* **70**, 205125 (2004).
- 5) E. Ozbay, K. Guven, E. Cubukcu, K. Aydin, and B. K. Alici, "Negative refraction and subwavelength focusing using photonic crystals," *Mod. Phys. Lett. B* **18**, 1275 (2004). [INVITED]
- 4) E. Cubukcu, K. Aydin, S. Foteinopolou, C. M. Soukoulis, and E. Ozbay, "Subwavelength resolution in a two-dimensional photonic crystal based superlens," *Phys. Rev. Lett.* **91**, 207401 (2003).
- 3) Ekmel Ozbay, Koray Aydin, E. Cubukcu, M. Bayindir, "Transmission and reflection properties of composite double negative metamaterials in free space," *IEEE Trans. Antennas Propag.* **51**, 2592 (2003).
- 2) E. Cubukcu, K. Aydin, E. Ozbay, S. Foteinopoulou, and C. M. Soukoulis, "Electromagnetic waves: Negative refraction by photonic crystals," *Nature* **423**, 604 (2003).
- 1) M. Bayindir, K. Aydin, E. Ozbay, P. Markos and C. M. Soukoulis, "Transmission properties of composite metamaterials in free space," *Appl. Phys. Lett.* **81**, 120 (2002).

OTHER PUBLICATIONS (NON SCI-INDEX JOURNALS):

- 2) E. Ozbay, K. Guven, K. Aydin, and M. Bayindir, "Physics and applications of photonic nanocrystals," *Int. J. Nanotechnology* **1**, 379 (2004). [INVITED]
- 1) E. Ozbay, I. Bulu, K. Aydin, H. Caglayan, and K. Guven, "Physics and applications of photonic crystals," *Photonics and Nanostruct. - Fund. Appl.* **2**, 87 (2004).

CONFERENCE PROCEEDINGS and ABSTRACTS:

- 35) K. Aydin, Z. Li, and E. Ozbay, "Fishnet metamaterials at microwave frequencies with left-handed characteristics" SPIE Photonics Europe 2008, Strasbourg, France.
- 34) A. O. Cakmak, K. Aydin, E. Colak, Z. Li, F. Bilotti, L. Vegni, and E. Ozbay, "Enhanced transmission through a subwavelength aperture using metamaterials", SPIE Photonics Europe 2008, Strasbourg, France.
- 33) G. Badenes, B. Butun, K. Aydin, E. Ulker, S. Cheylan, G. Badenes, M. Forster, U. Scherf, and E. Ozbay, "Integrated organic/inorganic semiconductor light emitting devices", 14th Microoptics Conference (MOC' 08) Brussels, Belgium.
- 32) (INVITED) K. Aydin, and E. Ozbay, "Super-resolution in a two-dimensional negative-index metamaterial superlens", PIERS 2008, March 24-28, Hangzhou, China.
- 31) K. Aydin, Z. Li, S. Bilge, and E. Ozbay, "Transmission properties of omega shaped bianisotropic metamaterials" PIERS 2008, March 24-28, Hangzhou, China.
- 30) (INVITED) Ekmel Ozbay and Koray Aydin, "Negative refraction and subwavelength focusing using left-handed composite metamaterials" Proc. SPIE, 6901, 690104 (2008).
- 29) K. Aydin, and E. Ozbay, "Imaging beyond the diffraction limit with two dimensional photonic crystals and left-handed metamaterials" SPIE Photonics West 2008, January 19-24, 2008, San Jose, CA.
- 28) (INVITED) E. Ozbay, And K. Aydin, "Review of experimental studies on microwave left-handed metamaterials", AIP Conf. Proc. 959, 72 (2007).
- 27) K. Aydin, and E. Ozbay, "Tunable split ring resonators at microwave frequencies" Metamaterials'2007, October 22-26 2007, Rome, Italy.
- 26) D. A. Pawlak, K. Kolodziejak, K. Rozniatowski, R. Diduszko, I. Vendik, K. Aydin, E. Ozbay, "TiO₂-SrTiO₃ eutectic with ferroelectric phase- growth and characterization" Metamaterials'2007, October 22-26 2007, Rome, Italy.
- 25) K. Aydin, and E. Ozbay, "Influence of disorders on transmission and reflection characteristics of microwave metamaterials" Metamaterials'2007 First International Congress on Advanced Electromagnetic Materials in Microwave and Optics, October 22-26 2007, Rome, Italy.
- 25) K. Aydin, B. Butun, E. Ulker, S. Cheylan, G. Badenes, U. Scherf, and E. Ozbay, "Towards GaN LED pumped distributed feedback organic lasers based on a diode-topolymer energy transfer" PHOREMOST Advances in Nanophotonics Workshop, September 13-15 2007, Istanbul, Turkey.

- 24) E. Ozbay, K. Aydin, K. Kolodziejak, and D. Pawlak, "Ferroelectric based tuneable SRR based metamaterials for microwave applications" European Microwave Conference (EUMC 2007), October 8-12 2007, Munich, Germany.
- 23) F. Bilotti, A. Toscano, L. Vegni, K. Aydin, K. B. Alici, and E. Ozbay, "Theoretical and experimental analysis of magnetic inclusions for the realization of metamaterials at different frequencies" IEEE MTT-S International Microwave Symposium (IMS 2007), June 3-8 2007, Honolulu, Hawaii.
- 22) K. Aydin, and E. Ozbay, "Sub-diffraction imaging with a negative-index metamaterial based superlens", Photonic and Electromagnetic Crystal Structures (PECS) VII, April 8-11 2007, Monterey, CA.
- 21) K. Aydin, I. Bulu, and E. Ozbay, "Subwavelength imaging and resolution by left-handed material superlens," The 1st European Topical Meeting on Nanophotonics and Metamaterials Jan. 8-11 2007, Tirol, Austria.
- 20) I. Bulu, H. Caglayan, K. Aydin, and E. Ozbay, "Highly directive antennas based on the SRR metamaterial medium", MRS Fall Meeting, Nov. 27 - Dec. 1 2006, Boston, MA.
- 19) K. Aydin, I. Bulu, K. Guven, and E. Ozbay, "Transmission properties of various split ring resonator systems", DPG Summer School Metamaterials, Bad Honnef, Germany, Sept. 17-22, 2006.
- 18) K. Aydin, and E. Ozbay, "Experimental realization of left-handed materials", MMS 2006, September 19-21, 2006 Genova, Italy.
- 17) K. Aydin, and E. Ozbay, "Negative refraction and focusing by a left-handed material slab in free space", CLEO/QELS Meeting, May 21-26, 2006 Long Beach, CA.
- 16) K. Aydin, I. Bulu, K. Guven, and E. Ozbay, "Transmission properties of various split ring resonator systems", CLEO/QELS Meeting, May 21-26, 2006 Long Beach, CA.
- 15) E. Ozbay, K. Aydin, G. Ozkan, I. Bulu, "Experimental demonstration of negative refraction and subwavelength imaging by left-handed composite metamaterials", in *Negative Index Materials -- From Microwave to Optical*, edited by S-Y. Wang, N.X. Fang, L. Thylen, M.S. Islam (Mater. Res. Soc. Symp. Proc. **919E**, Warrendale, PA, 2006), 0919-J03-06.
- 14) K. Aydin, I. Bulu, and E. Ozbay, "Verification of impedance matching at the surface of left-handed materials" Third Workshop on Metamaterials and Special Materials for Electromagnetic Applications and TLC, March 30-31 2006, Rome, Italy.
- 13) E. Ozbay, K. Aydin, K. Guven, and I. Bulu, "Observation of negative refraction and negative phase velocity in true left-handed metamaterials" Proc. SPIE Int. Soc. Opt. Eng. **5840**, 240 (2005).
- 12) E. Ozbay, K. Aydin, K. B. Alici, and K. Guven, "Negative refraction and subwavelength focusing using photonic crystals" Proc. SPIE Int. Soc. Opt. Eng. **5733**, 39 (2005).
- 11) K. Aydin, and E. Ozbay, "Experimental observation of negative refraction and negative phase velocity in left-handed metamaterials" Workshop on Metamaterials for Microwave and Optical Technologies, July 18-20 2005, San Sebastian, Spain.
- 10) K. Aydin, K. Guven, and E. Ozbay "Two dimensional left-handed metamaterial with a negative refractive index" *Journal of Physics: Conference Series*, **36**, 6 (2006)
- 9) E. Ozbay, K. Guven, K. Aydin, and K. B. Alici, "Electromagnetism using metamaterials and photonic crystals with negative index of refraction," First Workshop of the Metamorphose Network of Excellence, November 24-26 2004, Lille, France.

- 8) K. Guven, K. Aydin, and E. Ozbay “Experimental analysis of true left-handed behavior and transmission properties of composite metamaterials” PECS-VI Technical Digest (International Symposium on Photonic and Electromagnetic Crystal Structures VI Meeting, June 16-24, 2005, Crete, Greece)
- 7) K. Aydin, K. Guven, and E. Ozbay, “Experimental observation of true left-handed metamaterial” CLEO 2005 Technical Digest CD-ROM (CLEO/QELS Meeting, May 22-27, 2005 Baltimore, MD)
- 6) E. Ozbay, I. Bulu, K. Aydin, H. Caglayan, K. Guven, “Physics and Applications of Photonic Crystals,” 323. WE-Heraeus-Seminar, Physikzentrum Bad Honnef, Germany, 26 - 30 April 2004.
- 5) E. Ozbay, K. Aydin, and K. Guven, “Transmission and reflection properties of composite double negative materials in free space”, Progress in Electromagnetic Research Symposium (PIERS), Pisa, Italy, March 28-31, 2004.
- 4) E. Ozbay, K. Aydin, and K. Guven, “Subwavelength resolution using a 2D photonic crystal based superlens”, Progress in Electromagnetic Research Symposium (PIERS), Pisa, Italy, March 28-31, 2004.
- 3) E. Ozbay, I. Bulu, K. Aydin, H. Caglayan, and K. Guven. “Physics and Applications of 2D and 3D photonic crystals” PECS-V Technical Digest, page 8 (International Symposium on Photonic and Electromagnetic Crsytal Structures V Meeting, March 7-11, Kyoto, Japan).
- 2) K. Aydin, E. Cubukcu, E. Ozbay, and Mehmet Bayindir, “Transmission and reflection properties of composite metamaterials in free space.” CLEO 2003 Technical Digest, page 87 (CLEO/QELS Meeting, June 01-06, Baltimore, MD).
- 1) K. Aydin, Mehmet Bayindir, and E. Ozbay, “Microwave transmission through metamaterials in free space,” QELS 2002 Technical Digest, page 12 (CLEO/QELS Meeting, May 19-24, Long Beach, CA).

PROFESSIONAL PRESENTATIONS:

18. Fishnet metamaterials at microwave frequencies with left-handed characteristics, SPIE Photonics Europe 2008, April 7-11, 2008, Strasbourg, France (*Talk*).
17. Imaging beyond the diffraction limit with two dimensional photonic crystals and left-handed metamaterials, SPIE Photonics West 2008, January 19-24, 2008, San Jose, CA. (*Talk*)
16. Tunable split ring resonators at microwave frequencies, Metamaterials’2007, October 22-26 2007, Rome, Italy. (*Talk*)
15. Influence of disorders on transmission and reflection characteristics of microwave metamaterials, Metamaterials’2007, October 22-26 2007, Rome, Italy. (*Poster*)
14. Ferroelectric based tuneable metamaterials for microwave applications, European Microwave Conference, October 8-12 2007, Munich, Germany. (*Talk*)
13. Towards GaN LED pumped distributed feedback organic lasers based on a diode-to polymer energy transfer, PHOREMOST Advances in Nanophotonics Workshop, September 13-15 2007, Istanbul, Turkey. (*Poster*)
12. Subwavelength resolution with a negative-index metamaterial superlens, Photonics and Electromagnetic Crystal Structures (PECS) VII, Apr. 8-11, 2007, Monterey, CA, USA. (*Poster*)
11. Subwavelength imaging and resolution by left-handed material superlens, The 1st European Topical Meeting on Nanophotonics and Metamaterials (NANOMETA) Jan. 8-11, 2007, Tirol, Austria. (*Poster*)

10. Transmission properties of various split ring resonator systems, DPG Summer School Metamaterials, Bad Honnef, Germany, Sept. 17-22, 2006. (*Poster*)
9. Observation of negative refraction and negative phase velocity in left-handed metamaterials, European Microwave Conference (EUMC), Sept. 10-15, 2006, Manchester, UK. (*Invited talk*)
8. Negative refraction and focusing by a left-handed material slab in free space, CLEO/QELS Meeting, May 21-26, 2006 Long Beach, CA. (*Talk*)
7. Transmission properties of various split ring resonator systems, CLEO/QELS Meeting, May 21-26, 2006 Long Beach, CA. (*Poster*)
6. Verification of impedance matching at the surface of left-handed materials, Third Workshop on Metamaterials and Special Materials for Electromagnetic Applications and TLC, March 30-31, 2006, Rome, Italy. (*Talk*)
5. Experimental observation of negative refraction and negative phase velocity in left-handed metamaterials, Workshop on Metamaterials for Microwave and Optical Technologies, July 18-20, 2005, San Sebastian, Spain. (*Poster*)
4. Two dimensional left-handed metamaterial with a negative refractive index, Central European Workshop on Quantum Optics (CEWQO) June 6-9, 2005, Bilkent University, Ankara, Turkey. (*Talk*)
3. Experimental observation of true left-handed metamaterial, CLEO/QELS Meeting, May 22-27, 2005 Baltimore, MD. (*Talk*)
2. Transmission and reflection properties of composite double negative materials in free space, Progress in Electromagnetic Research Symposium (PIERS), March 28-31, 2004, Pisa, Italy. (*Talk*)
1. Transmission and reflection properties of composite metamaterials in free space, CLEO/QELS Meeting, June 01-06 2003, Baltimore, MD. (*Talk*)

SEMINARS:

1. University of California Berkeley (Prof. Xiang Zhang's group), January 18, 2008.
2. California Institute of Technology (Prof. Harry A. Atwater's group), January 24, 2008.
3. Harvard University (Prof. Federico Capasso's group), January 28, 2008.

MEDIA COVERAGE FOR THE WORKS

1. "Left-handed materials propel spectrum physics", **Photonics Spectra**, June 2006.
2. "New possibilities through negative refraction", **Optics and Photonics News**, August 2003.
3. "Photonic crystals produce negative refraction", **Laser Focus World**, July 2003.

GRANTS INVOLVED:

Principle Investigator: Prof. Ekmel Ozbay (Bilkent University, Ankara/TURKEY)

- EU-PHOREMOST (Nanophotonics to realize molecular scale technologies), Network of Excellence under EU FP6. October 2004- October 2008.
- EU-METAMORPHOSE, Network of Excellence under EU FP6. June 2004-June 2008.
- Development and Analysis of Left Handed Materials (DALHM), EU 5th Framework Project, IST, in collaboration with University of Crete, Greece and Imperial College, UK September 2002-March 2006. (2005 EU-Descartes Prize Winner)

REFERENCES:

Prof. HARRY A. ATWATER (Postdoc Supervisor)

California Institute of Technology

Thomas J. Watson Laboratory of Applied Physics, Pasadena, CA 91125.

Ph.D., Electrical Engineering, Massachusetts, 1987.

Prof. EKMEL OZBAY (Ph.D. Supervisor)

Bilkent University

Nanotechnology Research Center and Department of Physics, 06800, Ankara, Turkey

Ph.D., Electrical Engineering, Stanford University, 1992.

Prof. COSTAS M. SOUKOULIS

Iowa State University

Ames Laboratory and Dept. of Physics, Ames, Iowa, 50011, USA

Ph.D., Condensed Matter Physics, University of Chicago, Chicago, Illinois, 1978.