HATICE ALTUG

Associate Professor, BioEngineering Department, Ecole Polytechnique Federale de Lausanne (EPFL)
http://bios.epfl.ch/

EDUCATION

- **Stanford University** Ph.D. in Applied Physics 2006
  Thesis: Physics and Applications of Photonic Crystal Nanocavities. Advisor: Jelena Vuckovic
- **Stanford University** M.S. in Electrical Engineering 2006
- **Bilkent University** (Turkey) B.S. in Physics 2000

WORK EXPERIENCE:

- **EPFL, Switzerland,** Bioengineering Department**,** Associate Professor–with tenure 2013-current
- **Boston University,** Electrical and Biomedical Engineering**,** Associate Professor–tenured 2012-2013
- **Boston University,** Electrical and Computer Engineering**,** Assistant Professor– tenure track 2007-2012
- **Harvard Medical School**, Center for Engineering in Medicine, Post-doctoral Fellow 2006-2007

RESEARCH AREAS

- Experimental and theoretical research on nanophotonics for bio-nano sensing & spectroscopy
- Lab-on-a-chip optical sensors and microfluidics for point-of-care and global health applications.
- Novel nanofabrication methods for high-throughput, low cost and large-area manufacturing.

HONORS and AWARDS

2012 Optical Society of America Adolph Lomb Medal

2012 Tenured Faculty Position Offer from Cornell University (declined)

2012 Personal profile featured in IEEE Magazine “The Institute”

2011 Presidential Early Career Award for Scientists and Engineers (PECASE)

Highest honor bestowed by the United States government on outstanding scientists and engineers in their early career

2011 Popular Science Magazine Brilliant 10 Award

2011 Invited to U.S. National Academy of Engineering, Frontiers of Engineering Symposium

2011 IEEE Photonics Society Young Investigator Award

2010 ONR Young Investigator Award

2010 NSF CAREER Award

2010 Boston University College of Engineering Early Career Research Excellence Award

2008 Massachusetts Life Sciences Center New Investigator Award

2008 Boston University Dean’s Catalyst Award

2007 Boston University Peter Paul Career Development Professorship

2006 Tenure-Track Faculty Position Offers from UIUC, Purdue and Rice University (declined)

2006 IEEE /Photonics Society Best Student Paper Finalist

2005 IEEE/Photonics Society Research Excellence Award

2005 IEEE/Photonics Society Best Student Paper Award

2005-2007 Intel Graduate Student Fellowship Award

2004 Winner of Silicon Valley Innovator’s Challenge, Berkeley, CA

MAJOR SCIENTIFIC ACHIEVEMENTS

- Demonstrated the first ultra-sensitive and real-time surface enhanced infrared spectroscopy with engineered plasmonics and its application for protein detection.
- Demonstrated the first hand-held and high-throughput plasmonic microarray technology and its integration with lens-free microscopy for point-of-care diagnostics.
- Demonstrated a new plasmonic-nanofluidic technology for rapid detection of live and intact viruses.
- Introduced a new mass-scalable nanofabrication technique for low-cost and fast manufacturing of plasmonic nanostructures, and their implementation on wide range of substrates i.e polymers.
- Demonstrated the first ultrafast and ultra-compact on-chip photonic crystal nanocavity laser.

MENTORING

- **PhD thesis advisor of 7 students.** Following ones have graduated.

  Ronen Adato, PhD 2012
  Mid-Infrared Plasmonics for Ultra-Sensitive Spectroscopy of Biomolecular Interactions
  Received BU College of Engineering Best Dissertation Award (2012)

  Serap Aksu, PhD 2013
  Nanostencil Lithography for Metamaterials and Application on Vibrational Biospectroscopy
  Received Best Dissertation Award in BU Material Science Division (2013)

  Min Huang, PhD 2013
  Optofluidic Plasmonic On-Chip Nanosensor Arrays for Bio-Detection
  Semi-Finalist for Maiman Outstanding Student Paper Award in OSA CLEO (2012)

  Alp Artar, PhD 2013
  Engineering of Electromagnetic Interactions in Three-Dimensional Plasmonic Metamaterials
  Received Best Student Presentation Award in SPIE Optics and Photonics (2010)

  Arif Engin Cetin, PhD 2014
  Engineering of Plasmonics Excitations for Hand-Held and Ultra-Sensitive Biosensors
  Received Best Poster Award in Europt(r)ode (2014)

- **Mentored 8 post-doctoral fellows**.
  Dr. Ahmet Ali Yanik (2008-2012, currently professor in University of California at Santa Cruz, US)
  Dr. Betty Galarreta (2011-2013, currently professor in Pontifical Catholic University of Peru)
  Dr. Mustafa Turkmen (2010-2012, currently professor in Erciyes University, Turkey)
  Dr. Kai Chen (2009-2011, moved to Germany as Humboldt Research Fellow).
- Mentored >5 Master students, >20 undergraduate students
- Hosted high-school teachers (5), high-school students (>10).

REFEREED JOURNAL ARTICLES:

Total Citations: 2596 h-index: 26 i10-index: 36 (Source: Google Scholar, September 2014)

* indicates graduate & post-doctoral students under Altug's supervision.

J50. A. F. Coskun, A. E. Cetin*, B. C. Galarreta*, D. A. Alvarez*, **H. Altug** and A. Ozcan, "Lens-Free Opto-fluidic Plasmonic Sensor for Real-time and Label-free Monitoring of Molecular Binding Events over a Wide Field-of-view" **Scientific Reports**, DOI 10.1038/srep06789 (November, 2014).

J49. A. Mertiri, **H. Altug**, M.K. Hong, P. Mehta, J. C. Mertz, L. D. Ziegler, and S. Erramilli "Nonlinear Mid-infrared Photothermal Spectroscopy Using Zharov Splitting and Quantum Cascade Lasers" **ACS Photonics**, **DOI:** 10.1021/ph500114h (July 2014).

J48. A. E. Cetin*, D. Etezadi*, **H. Altug** "Accessible Nearfields by Nanoantennas on Nanopedestals for Ultrasensitive Vibrational Spectroscopy." **Advanced Optical Materials**, DOI: 10.1002/adom.201400171 (June 2014).

J47. A. E. Cetin*, A. F. Coskun, B. C. Galarreta*, M. Huang*, D. Herman, A. Ozcan and **H.** Altug, "Handheld High-Throughput Plasmonic Biosensor Using Computational On-Chip Imaging." **Nature Light Science and Applications**, DOI 10.1038/lsa.2014.3 (January, 2014).

The work is highlighted in many scientific news outlets, January 2014.

J46. C. Yilmaz, A. E. Cetin[*], G. Goutzamanidis, J. Huang, S. Somu, **H. Altug**, D. Wei, A. Busnaina "Three-Dimensional Crystalline and Homogeneous Metallic Nanostructures Using Directed-Assembly of Nanoparticles." **ACS Nano** DOI: 10.1021/nn500084g (April 2014).

J45. R. Adato[*] and **H. Altug** "In-situ Ultra-sensitive Infrared Absorption Spectroscopy of Biomolecule Interactions in Real-time with Plasmonic Nanoantennas." **Nature Communications** Vol.4, 2154, DOI 10.1038/ncomms3154 (2013).

The work is highlighted in many scientific news outlets, August 2013.

J44. M. Huang[*], B. Galarreta*, A. E. Cetin*, and **H. Altug** "Actively Transporting Virus Like Analytes with Optofluidics for Rapid & Ultrasensitive Biodetection." **Lab on a Chip** Vol. 13, pp. 4841-4847 (2013).

J43. R. Adato[1*], A. Artar[1*], S. Erramilli, **H. Altug** "Engineered Absorption Enhancement and Induced Transparency in Coupled Molecular and Plasmonic Resonator Systems". **Nano Letters** Vol.13, pp 2584-2591 (2013). [1]Equally contributed.

J42. A. E. Cetin*, A. Mertiri, S. Erramilli, and **H. Altug** "Thermal Tuning of Surface Plasmon Polaritons Using Liquid Crystals." Adv. Optical Materials Vol.1, pp 915-20 (2013).

J41. S. Aksu[*], A, Cetin*, R. Adato[*], **H. Altug** "Plasmonically Enhanced Vibrational Biospectroscopy Using Low-Cost Infrared Antenna Arrays by Nanostencil Lithography." Adv. Optical Materials Vol. 1, pp 780-85 (2013).

*This work is selected as **inside cover article** of Advanced Optical Materials, issue 11, 2011.*

J40. C. W Hui[1], A. B. Khanikaev[1], R. Adato[1*], N. Arju, A. A. Yanik*, **H. Altug**, G. Shvets, " Fano-Resonant Asymmetric Metamaterials for Ultra-sensitive Spectroscopy and Identification of Molecular Monolayers". **Nature Materials** Vol.11, pp 69-75 (2012). [1]Equally contributed.

The work is featured in Nature Materials News & Reviews Vol. 11 pp 9-10 (2012).

J39. A. E. Cetin* and **H. Altug**, "Fano Resonant Ring/Disk Plasmonic Nanocavities on Conducting Substrates for Advanced Biosensing ". **ACS Nano** Vol. 6, pp 9989-9995 (2012).

J38. A. E. Cetin*, A. A. Yanik*, A. Mertiri, S. Erramilli, O. E. Mustecaplioglu and **H. Altug**, "Field-Effect Active Plasmonics for Ultracompact Electro-Optic Switching". **Applied Physics Letters** Vol.101, 121113 (2012).

J37. M. Huang*, B. C. Galarreta*, A. Artar*, R. Adato*, S. Aksu*, **H. Altug**, "Reusable Nanostencils for Creating Multiple Biofunctional Molecular Nanopatterns on Polymer Substrate". **Nano Letters** Vol. 12, pp. 4817-22 (2012).

J36. K. Chen*, R. Adato*, **H. Altug**, "Dual Band Perfect Absorber for Multi-Spectral Plasmon-Enhanced Infrared Spectroscopy". **ACS Nano** Vol. 6, pp. 7998-8006 (2012).

J35. A. Mertiri, T. Jeys, V. Liberman, M. K. Hong, J. Mertz, **H. Altug**, S. Erramilli, "Mid-infrared Photo-thermal Heterodyne Spectroscopy in a Liquid Crystal Using a Quantum Cascade Laser". **Applied Physics Letters** Vol. 101, 044101 (2012).

J34. V. Liberman, R. Adato*, T. H. Jeys, B. G. Saar, S. Erramilli, **H. Altug**, "Rational Design and Optimization of Plasmonic Nanoarrays for Surface Enhanced Infrared Spectroscopy". **Optics Express** Vol. 20, pp. 11953-11967 (2012).

J33. A. E. Cetin*, M. Turkmen*, S. Aksu* and **H. Altug**, "Nanoparticle-Based Metamaterials as Multiband Plasmonic Resonator Antennas". IEEE Transactions on Nanotechnology Vol. 11, pp 208-212 (2012).

J32. R. Adato*, A. A. Yanik*and **H. Altug**, "On Chip Plasmonic Monopole Nano-Antennas and Circuits". **Nano Letters** Vol. 11, pp 5219-5226 (2011).

J31. T-Y. Chang, M. Huang*, A. A. Yanik*, H. Y. Tsai, P. Shi, S. Aksu*, M. F. Yanik, **H. Altug**, "Large- Scale Plasmonic Microarrays for Label-Free High-Throughput Screening". **Lab on a Chip** Vol. 11, pp 3596-3602 (2011).

*This work is selected as **cover article** of Lab on a Chip Journal, issue 21, 2011.*

*It is highlighted as "**Hot Paper**" by Lab on a Chip.*

J30. S. Aksu*, M. Huang*, A. Artar*, A. A. Yanik*, M. Dokmeci, **H. Altug**, "Flexible Plasmonics on Unconventional Substrates". **Advanced Materials** Vol. 23, pp 4422-4430 (2011).

*The work is selected as the frontispiece **cover article** of Advanced Materials, issue 38, 2011.*

The work is also featured in Nature Materials and Institute of Physics Nanotech web-site with a news-story

J29. A. Yanik*, A. E. Cetin*, M. Huang*, A. Artar*, S. H. Mousavi, A. Khanikaev, J. H. Connor, G. Shvets, **H. Altug**, "Seeing Protein Monolayers with Naked Eye Through Plasmonic Fano Resonances", Proceedings of National Academy of Sciences (**PNAS**) Vol. 108, pp 11784-11789 (2011).

Highlighted in Lab on a Chip Journal's Research Highlight section.

Featured on Institute of Physics Nanotech web-site with a news-story.

J28. A. Artar*, A. A. Yanik*, **H. Altug**, "Highly Directional Double Fano Resonances in Plasmonic Hetero-Oligomers". **Nano Letters** Vol. 11, pp 3694-3700 (2011).

J27. A. E. Cetin*, A. Artar*, M. Turkmen*, A. A. Yanik*, **H. Altug**, "Plasmon Induced Transparency in Cascaded Pi-Shaped Metamaterials", Optics Express, Vol. 19, pp. 22607-22618 (2011).

J26. V. Liberman, R. Adato*, A. Mertiri, A. A. Yanik*, K. Chen*, T. H. Jeys, S. Erramilli, **H. Altug**, "Angle- and Polarization-Dependent Collective Excitation of Plasmonic Nanoarrays for Surface Enhanced Infrared Spectroscopy", Optics Express Vol. 19, pp. 11202-11212 (2011).

J25. M. Turkmen*, S. Aksu*, A. E. Cetin*, A. A. Yanik*, **H. Altug**, "Multi-resonant Metamaterials Based on UT-shaped Nano-aperture Antennas", Optics Express Vol. 19, pp. 7921-7928 (2011).

J24. A. Artar*, A. A. Yanik*, **H. Altug**, "Multi-Spectral Plasmon Induced Transparency in Coupled Meta-Atoms" **Nano Letters** Vol. 11, pp. 1685-1689 (2011).

J23. A. E. Cetin*, A. A. Yanik*, C. Yilmaz, S. Somu, A. B. Busnaina, **H. Altug**, "Monopole Antenna Arrays for Optical Trapping, Spectroscopy and Sensing", Applied Physics Letters, Vol. 98, 111110 (2011).

J22. A. A. Yanik*, M. Huang*, O. Kamohara*, A. Artar*, T. W. Giesbert, J. J. Connor and **H. Altug**, "An Optofluidic Nanoplasmonic Biosensor for Direct Detection of Live Viruses from Biological Media" **Nano Letters** Vol. 10, pp. 4962-4969 (2010).

Featured on many science/technology media worldwide (US, Germany, India).

J21. S. Aksu*, A. Yanik*, R. Adato*, A. Artar*, M. Huang*, **H. Altug**, "High-Throughput Nanofabrication of Plasmonic Infrared NanoAntenna Arrays for Vibrational Nanospectroscopy", **Nano Letters** Vol. 10, pp. 2511-2518 (2010).

Featured on Institute of Physics Nanotech web-site with a news-story.

J20. A. A. Yanik*, M. Huang*, A. Artar*, T. Chang, **H. Altug**, "Integrated Nanoplasmonics-Nanofluidics Biosensor with Targeted Delivery of Analyte", **Applied Physics Letters** Vol. 96, 021101 (2010).

*Selected as **cover article** of 11 January 2010 issue of Applied Physics Letters.*

Top 2 most downloaded research article in Applied Physics Letters in January 2010.

J19. R. Adato*, A. A. Yanik*, C-H Wu, G. Shvets and **H. Altug**, "Radiative Engineering of Plasmon Lifetimes in Embedded Nanoantenna Arrays," Optics Express Vol. 18, pp. 4526-4537(2010).

J18. A. A. Yanik*, R. Adato*, **H. Altug**, "Design Principles for Optoelectronic Application of Extraordinary Light Transmission Effect in Plasmonic NanoAperture" Journal of Nanoscience and Nanotechnology, Special Issue on Nanophotonics and Nanooptics Vol. 10, pp. 1713-1718 (2010). *Invited Article*

J17. R. Adato*, A. A. Yanik*, J. J. Amsden, D. L. Kaplan, F. G. Omenetto, M. K. Hong, S. Erramilli and **H. Altug**, "Ultra-sensitive Vibrational Spectroscopy of Protein Monolayers with Plasmonic Nanoantenna Arrays", Proceedings of National Academy of Sciences (**PNAS**) Vol. 106, 19227 (2009).

*Featured on the **front page** of National Science Foundation web-site with a news story.*

Highlighted on BioPhotonics International, Future Medicine Magazine and on many media outlets.

J16. A. Artar*, A. A. Yanik* and **H. Altug** "Fabry-Perot Nanocavities in Multi-layered Plasmonic Crystals for Enhanced Biosensing", Applied Physics Letters Vol. 95, 051105 (2009).

Top 10 most downloaded research article in Applied Physics Letters in August 2009.

J15. M. Huang*, A. A. Yanik*, T. Chang, **H. Altug**, "Sub-Wavelength Nanofluidics in Photonic Crystal Sensors" Optics Express Vol. 17, pp.24224-24233 (2009).

J14. A. A. Yanik*, R. Adato*, S. Erramilli and **H. Altug**, "Hybridized Nanocavities as Single-Polarized Plasmonic Antenna", Optics Express Vol. 17, pp.20900-20910 (2009).

J13. D. Englund, **H. Altug**, and J. Vuckovic, "Time-Resolved Lasing Action From Single and Coupled Photonic Crystal Nanocavity Array Lasers Emitting in the Telecom Band" Journal of Applied Physics Vol. 105, 2009.

J13. A. A. Yanik*, X. Wang, S. Erramilli, M.K. Hong, **H. Altug**, "Extraordinary Mid-Infrared Transmission of Rectangular Coaxial Aperture" Applied Physics Letters Vol. 93, 081104 (2008).

Featured on Institute of Physics Nanotech web-site with a news-story.

J11. D. Englund, **H. Altug**, Bryan Ellis, and J. Vuckovic, "Ultrafast Photonic Crystal Lasers", Lasers and Photonics Review, 1-11 (2008). ***Invited Paper***

J10. D. Englund[1] and **H. Altug[1]**, J. Vuckovic, "Low-Threshold Surface-Passivated Photonic Crystal Nanocavity Lasers" *Applied Physics Letters* Vol. 91, 071124 (2007). [1]*Authors equality contributed.*

J09. D. Englund, **H. Altug**, Ilya Fushman and J. Vuckovic. "Efficient Terahertz Room-Temperature Photonics Crystal Nanocavity Laser" Applied Physics Letters Vol. 91, 071126 (2007).

J08. **H. Altug**, D. Englund, and J. Vuckovic, "Ultrafast Photonic Crystal Nanocavity Lasers" Nature Physics Vol. 2, pp 484–488 (2006).

*Selected as **cover article** of Nature Physics June 2006.*

Featured in Nature Photonics and many scientific magazines.

J07. **H. Altug**, and J. Vuckovic, "Photonic Crystal Nanocavity Array Laser" Optics Express Vol. 13, pp 8819–8823 (2005).

Featured in Photonics Spectra and IEEE LEOS magazines.

J06**. H. Altug**, and J. Vuckovic, "Polarization Control and Sensing in Two Dimensional Coupled Photonic Crystal Nanocavity Arrays" Optics Letters Vol. 30, pp 982–984 (2005).

J05. **H. Altug**, and J. Vuckovic, "Experimental Demonstration of Slow Group Velocity in Two Dimensional Coupled Photonic Crystal Microcavity Arrays" Applied Physics Letters Vol. 86, pp 111102 (2005).

J04. **H. Altug**, and J. Vuckovic, "Two Dimensional Coupled Photonic Crystal Resonator Arrays" Applied Physics Letters Vol. 84, pp 161-163 (2004).

*Selected as **cover article** of 12 January 2004 issue of Applied Physics Letters.*

J03. N. C. Helman, J. E. Roth, D. P. Bour, **H. Altug**, D. Miller, "Misalignment-Tolerant Surface-Normal Low-Voltage Modulator for Optical Interconnects" IEEE Journal of Selected Topics in Quantum Electronics Vol. 11, pp 338-340 (2005).

*Featured in IEEE Photonics (formerly LEOS) Magazine as "**Hot Research**".*

J02. M. F. Yanik, **H. Altug**, J. Vuckovic and S. Fan, "Sub-Micron All-Optical Digital Memory and Integration of Nano-Scale Photonic Devices Without Isolators" IEEE Journal of Lightwave Technology Physics Letters Vol. 22, pp 2316-2319 (2004).

J01**.** B. Temelkuran, **H. Altug**, E. Ozbay, "Experimental Investigation of Layer-by-Layer Metallic Photonic Crystals" IEE Proceedings on Optoelectronics Vol. 145, pp 409 (1998).

SELECTED PROFESSIONAL ACTIVITIES

- **Scientific Outreach:**
  IEEE Photonics Society Liaison for IEEE Women in Engineering (2010-current)
  President of OSA Student Chapter of Stanford, 2005-2006 (received OSA Chapter Excellence Award)

- **Guest and Associate Editor:**
  IEEE Journal of Selected Topics in Quantum Electronics, Issue on "Nanoplasmonics" (2011-2013).
  IEEE Journal of Quantum Electronics (2014, declined)

- **Editorial Advisory Board:**
  ACS Photonics, American Chemical Society (2013-current)
  Advanced Optical Materials, Wiley (2012-current)

- **Committee Chair:**
  OSA CLEO/QELS, "Nano-Optics and Plasmonics" (2013- current)
  IEEE Photonics Society, "Nanophotonics" (2011-2012)

- **Committee Members:**
  Europt(r)ode (2013-current), OSA CLEO/QELS "Nano-Optics and Plasmonics" (2010-2013), SPIE Optics and Photonics "Nanostructured Thin Films VI" (2012-2013), IEEE Photonics "Nanophotonics" (2007-2010), "Integrated Optics and Opto-electronics" (2007-2010), SPIE Defense, Security and Sensing Conference "Micro-Nanotechnology Sensors, Systems, and Applications" (2008-2009), "Photonic Microstructured Sensors" (2012-2013), IEEE Optical MEMS and Nanophotonics (2010-2013)

- **Symposium Organizer:**
  CLEO Europe 2015, "Photonic Lab-on-a-Chip Biosensor" (2014-current)
  OSA Optical Sensors, "Plasmonic Sensors" (2012-2014)

- **Reviewer:**
  Received "Certificate of Appreciation" from American Chemical Society for reviewer service.

  Referee for various scientific journals: Nature Photonics, Nature Communications, Nature Materials, Nature Nanotechnology, Science, Proc. of National Academy of Sciences, Phys.Rev.Lett, Phys.Rev.X., Nano Letters, ACS Nano, ACS Photonics, Lab-on-a-Chip, Advanced Materials and many others.

  Referee for major grant agencies such as EU, NSF, NIH, ONR, DoD, foundations and ad-hoc funding calls.

INVITED UNIVERSITY SEMINARS, COLLOQUIA AND LECTURES:

I-29 **King's College London,** Physics Department, London, **UK**, October 2014.

I-28 **University of Glasgow,** Chemistry Department Seminar Series, Glasgow, **UK**, January 2014.

I-27 **Deutsche Physikalische Gesellschaft** WE-Heraeus-Seminar on "Active Nanoplasmonics and Metamaterial Dynamics School Lectures on "Active Plasmonics", Physikzentrum Bad Honnef, **Germany**, January 2014.

I-26 **FOM Institute AMOLF**, Public Colloquium, Amsterdam, **Netherlands**, January 2014.

I-25 **EPFL Photonics Day** Lecture, Lausanne, **Switzerland,** November 2013.

I-24 Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona, **Spain**, November 2013.

I-23 **ICFO, Institute of Photonics Science**, Barcelona, **Spain**, November 2013.

I-22 **ETH**, Department of Biosystems Science and Engineering Seminar Series, Basel, **Switzerland** Oct. 2013.

I-21 **Massachusetts Institute of Technology**, Chemistry Department Seminar, Cambridge, MA, May 2013.

I-20 **IEEE Photonics Society Boston Chapter Lecture Series**, MIT Lincoln Labs, Cambridge, MA, Feb. 2013.

I-19 **Abdus Salam International Center for Theoretical Physics,** Nanophotonics Workshop, Trieste Italy, December 2012.

I-18 **University of Colorado**, Electrical and Computer Engineering Seminar, Boulder, CO, Sept. 2012.

I-17 **Ecole Polytechnique Federal de Lausanne (EPFL),** Institute of Bioengineering, Lausanne, **Switzerland,** May 2012.

I-16 **McGill University**, Interdisciplinary Micro and Nano Biotechnology Workshop, Montreal, **Canada,** February 2012.

I-15 **Deutsche Physikalische Gesellschaft Physikzentrum Summer School Lectures** on "Bio-Photonics: Optical Biosensors and Optofluidics", Bad Honnef, **Germany**, September 2011.

I-14 **Cornell University**, Electrical and Computer Engineering, EDS Seminar Series, Cornell, NY, Sept. 2011.

I-13 **City University of New York (CUNY)**, Physics Department, Manhattan, NY, September 2011.

I-12 **ETH Zurich (Swiss Federal Institute of Technology)**, Zurich, **Switzerland**, July 2011.

I-11 **Boston University** Electrical and Computer Engineering Department **Tenure Talk**, Boston, MA May 2011.

I-10 **Massachusetts Institute of Technology**, Electrical Engineering and Computer Science, Optics and Quantum Electronics Seminar, Cambridge, MA, April 2011.

I-09 **University of Texas at Austin**, Center for Nano and Molecular Science and Technology, Austin, TX, April 2011.

I-08 **MIT**, Institute for Soldier Nanotechnologies, Cambridge, MA, March 2011.

I-07 **Harvard University**, Chemistry Department, Physical Chemistry Seminar, Harvard, MA, March 2011.

I-06 **Boston University** Lecture at Photonics Center Future of Light Symposium, Boston, MA December 2010.

I-05 **Boston University** Material Science and Engineering Division, Boston, MA October 2010.

I-04 **Worldwide Universities Network Summer School** on "Nanotechnology for Healthcare" **United Kingdom**, September 2010. Lecture on "Nanoplasmonics for Ultrasensitive Bimolecular Detection".

I-03 **Lehigh University**, Bethlehem, PA, October 2010. "

I-02 **UMass Lowell**, Physics Department Seminar Series, March 2009, Lowell, MA.

I-01 **Boston University**, Photonics Center's Future of Light Symposium, June 2008, Boston, MA.

INVITED PLENARY and KEYNOTE PRESENTATIONS:

KP-4 Fotonik 2013, **Ankara, Turkey**, September 2013. "Plasmonics for Advanced Mid-Infrared Spectroscopy and Nano-BioSensor Systems".

KP-3 META'13 Conference, **Dubai, UAE**, March 2013. "Plasmonic Metamaterials for Enhanced Spectroscopy and Biosensing".

KP-2 SPIE Optics and Photonics Conference, Plasmonics Symposium, **San Diego, CA**, August 2012. "Flexible and Stretchable Plasmonics and Metamaterials".

KP-1 11th European Conference on Optical Chemical Sensors and Biosensors, EUROPT(R)ODE, **Barcelona, Spain**, April 2012. "Nanoplasmonics-Nanofluidics Biosensors".

INVITED CONFERENCE TALKS:

IC-37 OSA Latin America Optics and Photonics Conference, Cancun, Mexico, November 2014. "Hand-Held and High-Throughput Biosensor with Plasmonics and Lens-Free Imaging".

IC-36 Gordon Research Conference, Maine, US, July 2014. "Plasmonics: Manipulating Light-Matter Interaction at the Nanoscale".

IC-35 IRDG - Infrared Meeting, Vienna, Austria April 2014. "Time-Resolved and Ultra-Sensitive Surface Enhanced Infrared BioSpectroscopy with Engineered Plasmonics".

IC-34 SPIE Photonics West Conference, California, US, February 2014. "Actively Transporting Virus Like Analytes with Optofluidics for Rapid and Ultrasensitive Biodetection".

IC-33 Materials Research Society Fall Meeting, Massachusetts, US, December 2013. "Mid-Infrared Plasmonics for Time-Resolved and Ultra-Sensitive Biospectroscopy"

IC-32 Metamaterials, Bordeaux, France, September 2013. "Plasmonics for High Throughput Diagnostics and Biosensing Technologies".

IC-31 PIERS, Stockholm, Sweden, August 2013. “Real-time and Ultra-sensitive Infrared Absorption Biospectroscopy of Molecular Interactions with Plasmonic Nano-antennas”.

IC-30 8th Reunion Espanola de Optoelctronica, Madrid, Spain, July 2013. “Plasmon-enhanced Infrared Spectroscopy for Biotechnological Applications”.

IC-29 17th International Conference on Solid-State Sensors, Actuators, and Microsystems, **Barcelona Spain**, June 2013. “High-Throughput and Low-Cost Nanophotonics Based Diagnostics Technologies”.

IC-28 Conference on Lases and Electro-Optics Europe, **Munich Germany**, May 2013. “Integrated Plasmonic NanoBiosensors”.

IC-27 Optical Society of America, Bio-Optics: Design and Application Symposium, Hawaii, US, April 2013. “Plasmonic Microarrays for Biology”.

IC-26 The 43rd Winter Colloquium on the Physics of Quantum Electronics, Utah, US January 2013. ‘‘Plasmon Enhanced Mid-Infrared Spectroscopy for Biology”.

IC-25 European Optical Society (EOS) Annual Meeting, Aberdeen, **UK**, September 2012. “Plasmonic Metamaterials for Multi-Functional Mid-IR Sensing”

IC-24 Metamaterials Conference, St. Petersburg **Russia**, September 2012. “Metamaterial biological sensors”.

IC-23 META’12 Conference, Paris **France**, April 2012. “Bioplasmonics: Biomolecular Detection and Identification with Metamaterial Nanoantennas”.

IC-22 SPIE Defense, Security and Sensing, Maryland, US, April 2012. “Large-Area and Label-Free Plasmonic Microarrays”.

IC-21 American Physical Society March Meeting, Massachusetts, US, March 2012. “Metamaterials for Ultra-sensitive Spectroscopy and Identification of Biomolecules”.

IC-20 SPIE Photonics West Conference, California, US, January 2012. “Flexible and Stretchable Plasmonics and Metamaterials”.

IC-19 Material Research Society Fall Meeting, Massachusetts, US, November 2011. “Plasmonic Metamaterials for Multi-Resonant Spectroscopy and High Resolution Optical Trapping”.

IC-18 5th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Barcelona, **Spain**, 10-15 October 2011. “Multi-Spectral Plasmon Induced Transparency in Coupled Meta-Atoms”.

IC-17 IEEE Photonics Society Annual Meeting, Washington DC, US, October 2011. “Plasmon Enhanced Photodetectors For Smart Lighting Applications”.

IC-16 SPIE Optics and Photonics, NanoScience + Engineering Conference, California, US, August 2011. “Metamaterial and Nanoplasmonic Toolkit for Spectroscopy and Biosensing”.

IC-15 International Union of Radio Science (URSI) general Assembly and Scientific Symposium, Istanbul, **Turkey**, August 2011. “On-Chip Plasmonic Systems for Ultrasensitive Spectroscopy and Biodetection”.

IC-14 OSA Optical Sensors, Toronto, **Canada**, June 2011. “Integrated Plasmonics for Ultrasensitive Spectroscopy and Biodetection”.

IC-13 SPIE Photonics West BIOS (Frontiers in Biological Detection: From Nanosensors to Systems Symposium), California, US, January 2011. “Merging Nanophotonics and Nanofluidics for Active Analyte Delivery and Biosensing”.

IC-12 SPIE Photonics West OPTO (Silicon Photonics Symposium), California, US, January 2011. “Integrated Plasmonic Systems for Ultrasensitive Biodetection”.

IC-11 NANO META Conference, European Society of Physics, Tirol, **Austria**, January 2011. “Ultra-sensitive SEIRA with Plasmonic Nanoantennas”.

IC-10 Materials Research Society Fall Meeting, Massachusetts, US, December 2010. “Plasmonics Nanoantennas for Ultrasensitive Biomolecular Identification”.

IC-09 IEEE Photonics Society Annual Meeting, Colorado, US, November 2010. “Nanoplasmonic Systems for Ultrasensitive Biomolecular Detection and Identification”.

IC-08 IEEE Optical MEMS and Nanophotonics Conference, Sapporo, **Japan**, August 2010. “Plasmonics for Ultrasensitive Biomolecular Nanospectroscopy”.

IC-07 SPIE Optics and Photonics NanoScience + Engineering Conference, California, US, August 2010. “Nanoplasmonics for Ultrasensitive Vibrational Spectroscopy and Bimolecular Detection”.

IC-06 CIMIT Forum, Massachusetts, US, April 2010. “Nanoplasmonics for Ultrasensitive Vibrational Spectroscopy and Bimolecular Detection”.

IC-05 DARPA/MTO Workshop on Chip-Scale Photonic Resonance for Biological Detection, Virginia, US, March 2010. “On-Chip Nanoplasmonic-Nanofluidic Biosensors Overcoming Mass Transport Limitations”.

IC-04 Massachusetts Life Science Center, January 2010, Massachusetts, US, “Nanophotonics for High-Performance Bio-sensing”.

IC-03 New England Section of the Optical Society of America, February, 2008, Massachusetts, US, “Nanophotonic Devices for Communication and Sensing Applications”.

IC-02 New England Section of the IEEE Photonics Society, February 2007, Lincoln Laboratories, Massachusetts, US, “Nanophotonic devices for Communication and Sensing Applications”.

IC-01 IEEE Photoics Society (formerly LEOS) Annual Meeting, Montreal, **Canada**, November 2006. “Ultrafast Photonic Crystal Nanocavity Lasers”

MAGAZINE and NEWS ARTICLES:

* indicates graduate and post-doctoral students under Altug’s supervision.

M2. H. Altug, M. Huang*, R. Adato* and A. A. Yanik*, “Ultrasensitive Plasmonic Sensors Molding the Flow of Light and Fluidics”. SPIE Newsroom, 21 September 2010.

M1. H. Altug, and J. Vuckovic, “Photonic Crystal Nanocavity Arrays”. IEEE LEOS Newsletters Vol. 20, No 2, pp.4-11 (2006).

BOOK CHAPTERS:

* indicates graduate and post-doctoral students under Altug’s supervision.

B3. H. Altug, D. Englund and J. Vuckovic (2011). “Photonic Crystal Microcavity Light Sources”. Chapter in a book titled “Comprehensive Semiconductor Science and Technology, Vol. 6” by Elseiver (2011). Editor-in-chiefs are Bhattacharya, Fornari and Kamimura.

B2. H. Altug, A. A. Yanik*, R. Adato*, S. Aksu*, A. Artar*, and M. Huang*, “Plasmonics for Ultrasensitive Nanospectroscopy and Biosensing”. Chapter in a book title “Plasmonics and Plasmonic Metamaterials: Analysis and Applications” by World Scientific (2011). Editor-in-chiefs are Shvets and Tsukerman.

B1. H. Altug, A. Artar*, A. A. Yanik*, A. E. Cetin* and M. Huang*, “NanoPlasmonics: Towards Advanced Chemical and Biological tools”. Chapter in a book entitled "Optochemical nanosensors" by Taylor and Francis (2012). Editor-in-chiefs are Cusano, Cutulo and Arregui.

PATENTS:

* indicates graduate and post-doctoral students under Altug’s supervision.

P6. H. Altug, R. Adato* “In-situ ultra-sensitive infrared absorption spectroscopy of biomolecule interactions in real time with plasmonic nanoantennas” Provisional patent application is filed.

P5. **H. Altug,** A. A. Yanik*, R. Adato*, G. Shvets, "Methods and Systems Using Fano-Resonant Asymmetric Metamaterials for Ultrasensitive Spectroscopy" Boston University and University of Texas at Austin, Ref No.: BU-2012-0083. Provisional patent application is filed.

P4. **H. Altug**, M. Huang*, A. Artar*, A. A. Yanik*, "Nanostructure Biosensors and Systems and Methods of Use Thereof". Boston University Ref No.: BU09-64 and BU10-324. NP Ref No.: 701586-066802-PCT. Submitted for Patent Cooperation Treaty (PCT) application.

P3. **H. Altug**, R. Adato*, S. Aksu*, A.A. Yanik*, S. Erramilli, "Nanoantenna Arrays for Nanospectroscopy, Methods of Use and Methods of High-Throughput Nanofabrication". Boston University Ref No.: BU09-59 and BU 10-014. NP Ref No.: 701586-068771-PCT. Submitted for Patent Cooperation Treaty (PCT) application.

P2. **H. Altug**, D. Englund, I. Fushman and J. Vuckovic, "Ultrafast Photonic Crystal Nanocavity Laser". (Stanford University Office of Technology Licensing Docket Number: S07-121).

P1. **H. Altug** and J. Vuckovic, "Coupled Nanoscale Photonic Cavity Devices". 2003-2004. **Patent Granted** (Stanford University Office of Technology Licensing Docket Number: S03-238).

TEACHING at EPFL:

MICRO-561 BioMicroscopy I (Fall 2014)
A master level course aims to introduce the functions of optical microscopes, their advantages and limitations. Teach how to choose the type of microscope and the imaging method that are best suited for investigating the biological sample of interest.

MICRO-561 BioMicroscopy II (Spring 2015)
An experimental Master level course offering hands-on experience with optical microscopes. The course describes how to investigate biological samples, obtain high quality images.

BIO-467 Scientific Literature in Bioengineering (Fall 2014)
In School of Life Sciences, a Master level course with aim to teach effectively search modern scientific literature in the multidisciplinary field of bioengineering, critically analyze scieitntific papers, and present technical oral and poster presentations.

TEACHING at Boston University:

EC481 Introduction to Nanotechnology and Nanomaterials (F'09, F'10, S'12, F'12)
In College of Engineering, we introduced a new concentration in nanotechnology to better prepare undergraduates for this rapidly emerging field. I have been strongly involved during the planning and implementation of this concentration. I volunteered to develop the cornerstone course, EC481, and introduced it for the first time **in Fall 2009.**

To more effectively teach the concepts on nanotechnology, **in Fall 2010** I introduced five experimental hands-on modules on cutting edge nanotechnology research topics. These include (1) photonic crystals and gratings, (2) soft-lithography and nanofabrication, (3) characterization and synthesis of metallic nanoparticles (plasmonics), (4) characterization and synthesis of colloidal quantum dots, and (5) hands-on use of numerical simulation techniques where students design/analyze a microring resonator based optical filters. I used the grant we received from National Science Foundation on "Nanotechnology Undergraduate Education".

EC 560 Introduction to Photonics (F'07, S'08, F'08, S'09, S'11, F'11)
This is a graduate course offered both semesters (large numbers of undergraduates also take it during spring semester). The course covers basic theories of light, including ray optics, wave optics, electromagnetic optics, optical polarization, and guided wave optics. I updated this course to include recent advanced research trends on photonic and nanophotonics field in academia and industry.

EK131/2 **Photonics: Engineering Light (F'09, S'10)**
This course aims to introduce freshman students to the photonics field through hands-on projects. The students build a working "photo-phone" using basic elements (op-amps, resistors, capacitors, LEDs, detectors, speakers, microphones). I updated the course content and introduced two new experimental lab modules (covering three lectures) to describe light emitting diodes, semiconductor physics, diffractive optics and spectrum of light sources.

EK100 **Freshman Seminar (F'09)**
This course, offered to incoming freshman students, aims to prepare them for university education. As an advisor, I mentor students in my class in their class selection, education, and career development.

OUTREACH:

- Liaison of IEEE Photonics Society for IEEE Women in Engineering (WIE) Organization. I participate in IEEE WIE meetings to plan outreach activities promoting science and engineering among girls and women.
- Boston University Upward Bound Math-Science Program. During summers, I gave a day-long "Nano-Camp" workshop for 10-15 lower income and underrepresented high school students. Students learn diffraction phenomena and soft-lithography techniques with hands-on experiments.

- Boston University Summer Challenge Program: During summers, I thought "Engineering" Seminar series to recruit the engineers of future. Summer Challenge is a two-week long program for high school students, who are deciding which subject to choose for college. Students learn the nature of light, and the principles and applications of LEDs through hands-on experimental activities.

- NSF Research Experience for Teachers Program at Boston University: I hosted in total three high-school and middle-school teachers in my lab, where they involved with state-of-the art research. They also developed new modules and course materials on "nanotechnology" and "photonics" for incorporating into their science curriculum.
  Summer 2009: Physics teacher Liza Hensel from Boston Latin Academy, which is an urban Boston Public School with predominantly minority student body.
  Summer 2010: Physics teacher Gary Smith from St. John's Preparatory School Danvers, MA and Rick Comeau from Wm. Diamond Middle School Lexington, MA.
  Summer 2011: Physics teachers Valentina Sountssova from Bancroft School, Worcester, MA; David Bennett from the English High School, Boston, MA; and Gary Smith from St. John's Preparatory School, Danvers, MA.

- **At Stanford University (2000-2006):** As president of OSA Stanford Student Chapter, I organized science outreach activities to promote science at high schools, and also during Stanford Community Days. I designed and built experimental set-ups for educational demonstrations and hands-on training of high school students. During my presidency, our activities received 2005 **Student Chapter Excellence Award** from National OSA society.