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Electrical and Electronics Eng Dept
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RESEARCH INTERESTS

Invention of high-throughput, high-content and dynamic measurement techniques that enable integrated functional, phenotypical and genotypical analysis at single-cell level to overcome challenges in profiling human immune responses. Development of novel methodologies with ultra-sensitive detection and nanoscale imaging capability for biosensing, metrology, biology and medicine.

RESEARCH EXPERIENCE

Massachusetts Institute of Technology, Cambridge, MA USA

Postdoctoral Research Associate

Mar 2010 – Aug 2013

High-throughput and high-content single-cell assays for characterization and identification of broadly neutralizing antibodies for HIV.

Microwell assisted patterning of cells on surface and colocalization of microparticles for assay miniaturization. (Advisor: J. Christopher Love)

Boston University, Boston, MA USA

Postdoctoral Research Associate

June 2009 – Feb 2010

Optical fluorescent and label-free high-throughput detection techniques and applications to specific protein and DNA interactions. (Advisor: M. Selim Unlu)

Boston University, Boston, MA USA

Graduate Research Assistant

June 2005 - May 2009

Optical Detection and Manipulation of Biomolecular Conformations on Reflecting Surfaces
(Advisor: M. Selim Unlu)

Boston University, Boston, MA USA

Graduate Research Assistant

June 2004 - May 2005

Biosensing Applications of Microring Resonator Devices (Advisor: Bennett B. Goldberg)

EDUCATION

Boston University, Boston, Massachusetts USA

Ph.D., Electrical and Computer Engineering, May 2009

• Dissertation Title: “Spectral Fluorescence Measurements on Reflecting Surfaces Shedding Light onto Conformation and Orientation of Macromolecules”

Boston University, Boston, Massachusetts USA

M.S., Photonics, May 2005

• Thesis Title: “Label-free Optical Sensing of Biomolecules Using Microring Resonators”

Bilkent University, Ankara, Turkey

B.S., Electrical and Electronics Engineering, May 2003

HONORS AND AWARDS

Graduate Student Poster Award

Boston University Photonics Center Future of Light Symposium, June 2008

Engineering Dean Award

“Nanoscale Determination of Molecular Conformation on Layered Surfaces”

Boston University Science and Engineering Day Research Symposium, April 2008

Boston University Photonics Center Fellowship

Including tuition waiver and full monthly stipend, September 2006 - May 2007

H. J. Berman “Future of Light” Prize in Photonics

“Optical Sensing of Biomolecules Using Microring Resonators”

Boston University Science and Engineering Research Symposium, April 2005

VISITING AND INTERNSHIP ACTIVITIES

International AIDS Vaccine Initiative (IAVI), Brooklyn, New York

Visiting Researcher

April 2010

HIV-1 neutralization assay training. (Collaborators: Sanjay Phogat, Pascal Poignard)

Istituto di Chimica del Riconoscimento Molecolare, CNR, Milan, Italy

Visiting Researcher

April 2007, June 2008

Polymer synthesis/characterization and DNA /protein microarray preparation. (Collaborator: Marcella Chiari)

Technische Universität München, Munich, Germany

Visiting Researcher

April 2008

Detection of protein binding to electrically switchable surface immobilized DNA. (Collaborator: Ulrich Rant)

Koc University, Istanbul, Turkey

Visiting Researcher

August 2007

Electromagnetic modeling of dipole radiation near multilayer dielectric interfaces using Green's function formulations. (Collaborator: Irsadi Aksun)

Eidgenössische Technische Hochschule, Zurich, Switzerland

Visiting Researcher

March 2007

Growth of microtubules and preparation of kinesin surfaces for directed microtubule motion for fluorescence measurements. (Collaborator: Viola Vogel)

Single molecule surface preparation with fluorescent terrylene molecules in p-terphenyl film for molecular orientation studies. (Collaborator: Vahid Sandoghdar)

Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland

Visiting Researcher

June 2006

Use of clean room facilities for silicon dioxide-tantalum oxide waveguide fabrication for microring resonator structures and trenches for suspended carbon nanotubes. (Collaborator: Yusuf Leblebici)

Montana State University, Bozeman, Montana

Visiting Researcher

June 2002

Interference based optical measurements and programming in LabVIEW for instrument control. (Advisor: David Dickensheets)

Montana State University, Bozeman, Montana

Visiting Researcher

June 2001

Surface characterization via Time-of-Flight Secondary Ion Mass Spectroscopy (Advisor: Recep Avci)

TEACHING EXPERIENCE

Bahcesehir University, Boston, MA USA

Assistant Professor

September 2013-

Introduction to Electrical Engineering

Boston University, Boston, MA USA

Teaching Fellow

September 2003 - May 2004

Introduction to Electronics for Juniors

Electric Circuit Theory for Sophomores

PUBLICATION LIST

Book Chapters

3. A. Yalçın, Y. J. Yamanaka, J. C. Love, "Integrated single-cell analysis," "Single-Cell Analysis: Methods and Protocols," Series: "Methods in Molecular Biology", Humana Press, USA (Springer), Vol: 853, 211-235 (2012).

2. M.S. Unlu, A. Yalçın, M. Dogan, L. Moiseev, A. Swan, B.B. Goldberg, and C.R. Cantor, "Applications of Optical Resonance to Biological Sensing and Imaging: I. Spectral Self-Interference Microscopy," Biophotonics, Biological and Medical Physics, Biomedical Engineering, Springer (2008).

1. M.S. Unlu, E. Ozkumur, D. A. Bergstein, A. Yalçın, M. F. Ruane, B. B. Goldberg, "Applications of Optical Resonance to Biological Sensing and Imaging: II. Resonant Cavity Biosensors," Biophotonics, Biological and Medical Physics, Biomedical Engineering, Springer (2008).

Journal Articles

12. A. Yalcin, B. A. Thomas, J. C. Love, "Nano-well assisted patterning of cells for high-throughput screening,' in preparation for submission.

11. T. M. Gierahn, A. Yalcin, Y. J. Yamanaka, R. M. Greenblatt, B. L. Shacklett, J. C. Love, "Phenotyping rare cell samples by 16-color image cytometry and microengraving," in preparation for submission.

10. S. Ahn, C. Huang, E. Ozkumur, X. Zhang, J. Chinnala, A. Yalçın, S. Bandyopadhyay, S. Russek, M. S. Ünlü, C. DeLisi, and R. Irani, "TATA binding proteins can recognize nontraditional DNA sequences," Biophysical Journal, Vol. 103, pp. 1510-1517 (2012).

9. C. Pereira, A. Yalçın, M. Cretich, M. Chiari, M. S. Ünlü, D. Nunes, and D. A. Bergstein, "Synergetic Chemiluminescence and Label-Free Dual Detection for Developing a Hepatitis Protein Array," Journal of Immunological Methods, Vol. 371, No. 1-2, pp. 159-164 (2011).

8. P. S. Spuhler, J. Knezevic, A. Yalçın, Q. Bao, E. Pringsheim, P. Dröge, U. Rant, and M. S. Ünlü, "Platform for in situ real-time measurement of protein-induced conformational changes of DNA ," Proc. of the National Academy of Science, 4 (2010).

7. E. Ozkumur, S. Ahn, A. Yalçın, C. Lopez, E. Cevik, R. Irani, C. DeLisi, M. Chiari, and M. S. Ünlü, "Label-free microarray imaging for direct detection of DNA hybridization and single-nucleotide mismatches," Biosensors and Bioelectronics, 25, 7, 15 (2010).

6. E. Ozkumur, C. Lopez, A. Yalçın, J. H. Connor, M. Chiari, M. S. Unlu, "Spectral reflectance imaging for a multiplexed, high-throughput, label-free, and dynamic biosensing platform," *IEEE JSTQE*, 16, 3 (2010).
5. E. Ozkumur, A. Yalçın, M. Cretich, C. Lopez, D. Bergstein, B.B. Goldberg, M. Chiari, M.S. Unlu, "Quantification of DNA and protein adsorption by optical phase shift", *Biosensors and Bioelectronics*, 25 (2009).
4. A. Yalçın, F. Damin, E. Ozkumur, G. di Carlo, B. B. Goldberg, M. Chiari, and M. S. Unlu, "Direct Observation of Conformation of a Polymeric Coating with Implications in Microarray Applications," *Analytical Chemistry*, Vol. 81, pp. 625-630 (2009).
3. M. Dogan, A. Yalçın, S. Jain, M. B. Goldberg, A. K. Swan, M. S. Unlu, and B. B. Goldberg, "Spectral Self-Interference Fluorescence Microscopy for Subcellular Imaging," *IEEE Journal of Selected Topics in Quantum Electronics*, 14, 1 (2008).
2. D. A. Bergstein, I. E. Ozkumur, A. C. Wu, A. Yalçın, J. Needham, R. Irani, J. Gershoni, B.B. Goldberg, C. DeLisi, M. F. Ruane, and M. S. Unlu, "Resonant Cavity Imaging: A Means Toward High-Throughput Label-Free Protein Detection," *IEEE Journal of Selected Topics in Quantum Electronics*, 14, 1 (2008).
1. A. Yalçın, K. C. Papat, J. C. Aldridge, T. A. Desai, J. Hryniewicz, N. Chbouki, B. E. Little, O. King, V. Van, S. Chu, D. Gill, M. F. Anthes-Washburn, M. S. Unlu, and B. B. Goldberg, "Optical Sensing of Biomolecules Using Microring Resonators," *IEEE Journal of Selected Topics in Quantum Electronics*, 12, 1, 148-155 (2006).

Conference Papers

15. A. Yalçın, M. Cretich, G. di Carlo, L. Sola, M. Monroe, M. S. Unlu, M. Chiari, "Fluorescence enhancement on reflecting substrates for microarray applications," *IEEE Lasers and Electro-Optics Society 2009 Annual Meeting*, October 2009.
14. E. Özkumur, A. Yalçın, M. Cretich, F. Damin, C. Lopez, D. A. Bergstein, B. B. Goldberg, M. Chiari, M. S. Ünlü, "Optical Phase to Biological Mass Conversion for Label-free Interferometric Sensing Methods," *IEEE Lasers and Electro-Optics Society 2009 Annual Meeting*, October 2009.
13. E. Özkumur, A. Yalçın, S. Ahn, B. B. Goldberg, M. Chiari, M. S. Ünlü, "Spectral Reflectance Imaging Biosensor for high-throughput and label-free detection of biomolecular interactions," *IEEE Lasers and Electro-Optics Society 2009 Annual Meeting*, October 2009.
12. P. Spuhler, J. Knezevic, A. Yalçın, P. Droge, U. Rant, M. S. Unlu, "A Platform for in situ Real-Time Measurement of Protein Conformational Changes of DNA," *IEEE Lasers and Electro-Optics Society 2009 Annual Meeting*, October 2009.

11. P. Spuhler, J. Knezevic, A. Yalçın P. Droge, U. Rant, M. S. Unlu, "Real-Time Kinetics Measurements of Protein Induced Conformational Changes in DNA," *IEEE Lasers and Electro-Optics Society 2009 Annual Meeting*, October 2009.
10. A. Yalçın, F. Damin, I. E. Ozkumur, G. di Carlo, L. Sola, M. S. Ünlü, and M. Chiari, "Nanoscale Determination of a Polymeric Coating for Microarray Applications," *23rd International Symposium on MicroScale Bioseparations (MSB) 2009*, February 2009
9. I. E. Ozkumur, A. Yalçın, M. Cretich, M. S. Ünlü, and M. Chiari, "Label-free, dynamic and quantitative measurement of biomolecular interactions," *23rd International Symposium on MicroScale Bioseparations (MSB) 2009*, February 2009
8. A. Yalçın, I. E. Ozkumur, B. B. Goldberg, and M. S. Ünlü, "High lateral resolution spectral self-interference fluorescence microscopy using annular apertures," *Photonics West 2009 - BIOS*, January 2009
7. I. E. Ozkumur, A. Yalçın, F. Damin, B. B. Goldberg, M. Chiari, and M. S. Ünlü, "Label-free and dynamic measurement of biomolecular interactions for high-throughput diagnostics," *Photonics West 2009 - BIOS*, January 2009
6. A. Yalçın, F. Damin, I. E. Ozkumur, G. di Carlo, B. B. Goldberg, M. Chiari, and M. S. Ünlü, "Nanoscale Determination of Conformation of a Polymeric Coating on Layered Surfaces," *AVS 55th International Symposium and Exhibition*, October 2008
5. M. S. Ünlü, I. E. Ozkumur, J. Needham, D. A. Bergstein, B. B. Goldberg, A. Yalçın, P. S. Spuhler, R. Irani, and C. DeLisi, "Applications of Optical Resonance to Biological Imaging and Label-free Protein Microarrays (invited paper)," *EMBC08, Vancouver, Canada, August 20-24, 2008*, 2008
4. A. Yalçın, F. Damin, I. E. Ozkumur, G. di Carlo, B. B. Goldberg, M. S. Ünlü, and M. Chiari, "Characterization of A Polymeric Coating for Microarray Applications using Spectral Self-Interference Fluorescence Microscopy," *Photonics West 2008 - BIOS*, 2008
3. A. Yalçın, F. Damin, I. E. Ozkumur, G. di Carlo, B. B. Goldberg, M. Chiari, and M. S. Ünlü, "Characterization of Swelling of A Polymeric Coating for DNA Microarray Applications Using Spectral Self-Interference Fluorescence Microscopy," *Proceedings of IEEE Lasers and Electro-Optics Society 2007 Annual Meeting*, October 2007
2. A. Yalçın, K. C. Papat, M. F. Anthes-Washburn, N. Chbouki, T. A. Desai, M. S. Ünlü, and B. B. Goldberg, "Microring resonators for biochemical sensing," *Proceedings of CLEO/QELS 2005*, May 2005
1. A. Yalçın, J. C. Aldridge, K. C. Papat, T. A. Desai, N. Chbouki, M. S. Ünlü, and B. B. Goldberg, "Microring resonators for biochemical sensing," *Bulletin of APS Meeting*, March 2005