Amar S. Basu, Ph.D.

Associate Professor of Electrical & Computer Engineering and Biomedical Engineering
Director, Wayne State Nanofabrication Facility
Graduate Program Director, Department of Electrical and Computer Engineering
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Research Interests

My research spans two related areas: 1) Wearable sensors for continuous health monitoring, and 2) Lab-on-a-chip systems for medical diagnostics and high throughput assays. Other scientific interests and expertise include:

- Microfluidic and microscale physics
- MEMS and Microfabrication
- Point of care diagnostics
- Chemical separations
- Droplet digital assays
- Single cell genomics and proteomics

Academic Appointments

- *Graduate Program Director*, Department of Electrical and Computer Engineering — Sept. 2016 - Present
- *Director,* Wayne State Nanofabrication Facility — Sept. 2016 - Present
- *Visiting Scientist,* Wearable Devices Group, Intel Corporation — Jan. - May 2016
- *Visiting Scientist,* Aston Mass Spectrometry Labs, Purdue University (Prof. Graham Cooks) — Sept. 2015 - Aug 2016
- *Associate Professor with Tenure,* Wayne State University, Detroit MI — Aug. 2014 - Present
- *Assistant Professor,* Wayne State University, Detroit MI — Aug. 2008 - July 2014
- *Research Assistant,* University of Michigan (Prof. Yogesh Gianchandani) — Dec. 2002 - Aug. 2008

Education

University of Michigan, Ann Arbor, MI. — Sept. 1996 - Aug. 2008

- **Ph.D.**, **Electrical Engineering** - **Circuits and Microsystems,** August 2008.
  Thesis: Microthermal Devices for Fluidic Actuation by Modulation of Surface Tension.
  Advisor: Professor Yogesh Gianchandani
- **MSE**, **Biomedical Engineering - Biotechnology**, Summa Cum Laude, GPA 8.36/9.0, December 2005.
- **MSE, Electrical Engineering**, Summa Cum Laude, GPA 8.36/9.0, May 2003.
- **BSE**, **Electrical Engineering**, Summa Cum Laude, GPA 3.95/4.0, May 2001.

Honors and Awards

- College of Engineering Excellence in Teaching Award — 2014
- College of Engineering Outstanding Faculty Service Award — 2013
- National Science Foundation BRIGE award — 2009
- IEEE Professor of the Year (voted by ECE students) — 2009
- "Virtual microfluidic traps, filters, channels and pumps using Marangoni flows" selected for *Institute of Physics* Highlights of 2008 — 2008
- Sandia National Laboratories Harry S. Truman Fellowship — 2008
- Whitaker Foundation Biomedical Graduate Research Fellowship — 2003-2006
- NSF Graduate Fellowship, Honorable Mention — May 2003
- UM Zell-Lurie Institute Entrepreneurial Opportunity Grant — May 2006
- EECS Distinguished Achievement Award, Senior Scholar Award, Dean's List, James B. Angell Scholar, William Branstrom Prize, UM Regents-Alumni Scholarship, UM Honorary Engineering Scholarship, Schlumberger Collegiate Award, UM School of Music Merit Scholarship. — 1996-2001

Teaching Experience

- *Associate Professor, Wayne State University:* BioMEMS and Bioinstrumentation (ECE 7995) Solid State Electronics (ECE 4570), Electromagnetic Fields and Waves (ECE 4800) — 2008-Present
- *Adjunct Lecturer, University of Michigan Ann Arbor:* Advanced MEMS (EECS 514), Integrated Microsystems (EECS 515) — 2007-2008

Professional Service

- *Technical Program Committee,* IEEE International Conference on Sensors, Actuators, and Microsystems (Transducers) — 2016-Present
- *Technical Program Committee and Session Chair*, Society for Laboratory Automation and Sequencing (SLAS) Conference — 2013-2015
- *Minisymposia Editorial Board, Session Co-Chair and Ad-hoc reviewer*, IEEE Engineering in Medicine and Biology Conference — 2011-2012
- *Conference promotion and poster judging committee*, Micro Total Analysis Systems — 2011-2013
- *Advisory Board Member,* NIH/NIBIB Microfluidics in Biomedical Sciences Training Program — 2014-Present
- *Treasurer, IEEE Nanotechnology Section XVII (SE Michigan)* — 2012-Present
- *Panelist,* National Science Foundation: Electronic, Photonic, and Magnetic Devices (EPMD), Particulate and Multiphase Processes (PMP), Integrative, Hybrid, and Complex Systems (IHCS) Chemistry (CHEM). National Sciences and Engineering Research Council of Canada (NSERC), Canadian Institutes for Health Research (CIHR) Collaborative Health Research Projects Program (CHRP), US-Israel Binational Science Foundation, Academy of Finland, Agence Nationale de La Recherche (France) — 2009-Present
- *Reviewer* for Lab on Chip, Applied Physics Letters, Analytical Chemistry, Electrophoresis, Microfluidics and Nanofluidics, Biotechnology and Bioengineering, Sensors and Actuators, Journal of Micromechanics and Microengineering, Biomedical Microdevices, ACS Applied Materials, RSC Advances, and Wiley — 2004-Present
- *Lecturer and Curriculum Development*, Michigan Science Center Nanodays Summer Camp — 2008-Present
- *Science Fair Judge,* Science and Engineering Fair of Metro Detroit (SEFMD), Wayne State Junior Sciences Symposium, and First Robotics Southeast Michigan — 2011-Present
- *Member*, Institute of Electrical and Electronics Engineers (IEEE), IEEE Engineering in Medicine and Biology, IEEE Education — 1996-Present
- *Member*, Biomedical Engineering Society (BMES) and Chemical and Biological Microsystems Society (CBMS) — 2002-Present
- *Member*, Eta Kappa Nu and Golden Key Honor Societies — 2000-Present

Industry Experience

- *Microfluidics Consultant* to multiple biotech startup companies — 2010-Present
- *Senior Technical Consultant,* Picocal Inc., Ann Arbor, MI — 2006-2014
- *Circuit Design Consultant,* Mobius Microsystems (now IDT), San Jose CA — 2003-2004
- *Senior Software Consultant*, Arbortext, Ann Arbor MI — 2001-2003
- *Partner and Consultant*, idea2net Inc., Ann Arbor MI — 2000-2001
- *Circuit Designer*, Intel Advanced Technology Division, Hillsboro OR — 1998-1999

Research Funding

(**Total**: $2.8 Million, of which $1.5M directed to my lab, and $1.2M as Sole Investigator)

- *National Science Foundation* (CBET) Chemical and Biological Separations, "Fractionation, purification, and analysis of gases in microbubbles," Sole PI, $300,293. URL. — 2015-2018
- *Michigan Translational Research and Commercialization Fund (M-TRAC),* "Hi-Trace: a wearable heart rate monitor with beat-to-beat accuracy," Sole PI, $100,000. URL. — 2016-2017
- *National Science Foundation* (ECCS) Electronic Photonic and Magnetic Devices, "Optofluidic Tweezers," Sole PI, $335,340. URL. — 2012-2015
- *National Science Foundation* (CBET) Particulate and Multiphase Processes/Chemical and Biological Separations, "Tensiophoresis: Label Free Droplet Sorting in Surfactant Microgradients," Sole PI, $300,784. URL. — 2012-2015
- *National Science Foundation* (CBET) Chemical and Biological Separations, "Microfractionation in Droplets (µFD) - Linking Proteomic Separations to High-Throughput Functional Screening," Sole PI, $175,000. URL. — 2010-2012

- *Great Lakes Protection Fund*, "Automated Ballast Treatment Verification to Stop Invasive Species," Co-PI, $823,000. URL. 2012-2015
- *National Science Foundation* (ECCS), "MRI: Acquisition of a Dual Beam Focus Ion Beam System for Nanotechnology, Biomedical, and Energy Research," Co-PI, $750,000. URL. 2012-2015
- *Cardiovascular Research Institute* ISIS Award, "Ultraminiature Heart Monitor Ring for 24-hour Wireless Remote Patient Monitoring (RPM) of Cardiovascular Health," Co-PI, $23,000. 2011-2012

Journal Publications

1. **A.S. Basu**, "Digital Assays, Part I: Partitioning Statistics and Digital PCR," *Society of Laboratory Automation and Screening (SLAS) Technology Journal (formerly Journal of Laboratory Automation)*, accepted. **Invited Review Paper.**
2. **A.S. Basu**, "Digital Assays, Part II: Digital Protein and Cell Assays," *Society of Laboratory Automation and Screening (SLAS) Technology Journal (formerly Journal of Laboratory Automation)*, accepted. **Invited Review Paper.**
3. G.K. Kurup, **A.S. Basu**, "Tensiophoresis: droplet sorting and sensing using chemomechanical transport," *in process*.
4. R. Kebriaei, **A.S. Basu**, "Inline protein detection using droplet shape detector," *in process*.
5. A.C. Akram, S. Noman, R. Moniri-Javid, J.P. Gizicki, E.A. Reed, S.B. Singh, **A.S. Basu**, F. Banno, M. Fujimoto, and J.L. Ram, "Development of an automated ballast water treatment verification system utilizing fluorescein diacetate hydrolysis as a measure of treatment efficacy," *Water Research*, December 2014. DOI.
6. Eric A. Davidson, **A.S. Basu**, Travis S. Bayer, "Programming Microbes Using Pulse Width Modulation of Optical Signals," *Journal of Molecular Biology*, vol. 425, pp. 4161–4166, August 2013. (Impact factor 3.888). DOI.
7. **A.S. Basu**, "Droplet Morphometry and Velocimetry (DMV): A video processing software for time-resolved, label-free tracking of droplet parameters," *Lab on a Chip*, vol. 13, pp. 1892-1901, April 2013. DOI.
   (>50 research labs in 15 countries now use this software. Selection for Lab on a Chip Blog. Impact factor 6.5)
8. M. Chen, T. Mertiri, T. Holland, and **A.S. Basu**, "Optical microplates for high-throughput screening of photosynthesis in lipid-producing algae," *Lab on a Chip*, vol. 12, pp. 3870-3874, September 2012. **(Special issue for emerging investigators. Impact factor 6.5)**. DOI.
9. G.K. Kurup and **A.S. Basu**," Field Free Particle Focusing in a Microfluidic Plug," *Biomicrofluidics Special Issue on Multiphase Microfluidics*, vol. 6, pp. 022008, April 2012. **(Invited paper in special issue on multiphase microfluidics, highlighted by guest editor. Impact factor 3.9)**. DOI.
10. V. Trivedi, A. Doshi, G.K. Kurup, E. Ereifej, P.J. Vandevord, and **A.S. Basu**, "A Modular Approach for the Generation, Storage, Mixing, and Detection of Droplet Libraries for High Throughput Screening," *Lab on a Chip*, vol 10, pp. 2433-2442, 2010. (**Special issue for emerging investigators, Impact factor 6.5**). DOI.
11. **A.S. Basu** and Y.B. Gianchandani, "Microfluidic Doublets in Aqueous Samples Generated by Microfabricated Thermal Probes," *Sensors and Actuators A:Physical*, vol. 158, pp. 116-120, 2010. (Impact factor 2.0). DOI.
12. **A.S. Basu** and Y.B. Gianchandani, "A Programmable Array for Contact-Free Manipulation of Floating Droplets on Featureless Substrates by the Modulation of Surface Tension," *Journal of Microelectromechanical Systems*, vol. 18, pp. 1163-1172, 2009. (Impact factor 2.3). DOI.
13. **A.S. Basu** and Y.B. Gianchandani, "Surfaces feel the heat," *Nature Nanotechnology*, vol. 4, pp. 622-623, 2009. (**Invited paper, Impact factor 30.3**). DOI.
14. **A.S. Basu** and Y.B. Gianchandani, "Virtual microfluidic traps, filters, channels and pumps using Marangoni flows," *Journal of Micromechanics and Microengineering*, vol. 18, pp. 110531, 2008. (**Selected for Institute of Physics Highlights of 2008**, **Impact factor 2.9**). DOI.
15. **A.S. Basu** and Y.B. Gianchandani, "Shaping High-Speed Marangoni Flow in Liquid Films by Microscale Perturbations in Surface Temperature," *Applied Physics Letters*, vol. 90, pp. 03410/1-03410-3, 2007. (Impact factor 3.8). DOI.
16. **A.S. Basu**, S. McNamara, and Y.B. Gianchandani, "Scanning Thermal Lithography: Maskless, Submicron Thermo-Chemical Patterning of Photoresist by Ultracompliant Probes," *Journal of Vacuum Science and Technology B*, vol. 22, pp. 3217-3220, 2004. (Impact factor 2.9). DOI.
17. S. McNamara, **A.S. Basu**, and Y.B. Gianchandani, "Ultracompliant thermal probe array for scanning non-planar surfaces without force feedback", *Journal of Micromechanics and Microengineering*, vol. 15, pp. 237-243, 2004. (Impact factor 1.4). DOI.

Conference Publications (*Note: Majority are archived*)

18. R. Kebriaei and **A.S. Basu**, "Droplet Frequency Sensor: A New Modality for Sensitive, Label-free, Inline Biochemical Detection," *The 19th Intl. Conference on Solid-State Sensors, Actuators and Microsystems (Transducers)*, June 2017, Kaohsiung Taiwan. (**Oral Presentation, 20% acceptance rate from 940 submissions**)
19. P. Weerappuli and **A.S. Basu**, "Scalable 256-bit Droplet Random Access Memory (DRAM) Platform for Capture and Release of Single Microdroplets," *Micro Total Analysis Systems (MicroTAS)*, October 2016, Dublin Ireland (**Oral Presentation, 9% acceptance rate from >1100 submissions**)
20. M.S. Utomo and **A.S. Basu**, "Electrophoretic Fractionation and Detection of Proteins Using Droplets," *Micro Total Analysis Systems (MicroTAS)*, October 2016, Dublin Ireland.
21. G.K. Kurup and **A.S. Basu**, "Label-Free Detection of Proteins by Drop Shape Analysis," *Micro Total Analysis Systems (MicroTAS)*, October 2014, San Antonio TX. (**Oral Presentation, 9% acceptance rate from 1100 submissions**). PDF.
22. R. Kebriaei and **A.S. Basu**, "Label-Free Inline HPLC Detector using a Drop Generator," *Micro Total Analysis Systems (MicroTAS)*, October 2014, San Antonio TX. PDF.
23. G.K. Kurup and **A.S. Basu**, "Microfractionation of Gases Separated by Gas Chromatography," *Micro Total Analysis Systems (MicroTAS)*, October 2014, San Antonio TX. PDF.
24. G.K. Kurup and **A.S. Basu**, "Viscophoresis: Migration and Sorting of Droplets in a Viscosity Gradient," *Micro Total Analysis Systems (MicroTAS)*, October 2014, San Antonio TX. PDF.
25. R.M. Javid, S. Noman, A. Akram, **A.S. Basu**, and J. Ram, "Automated Ballast Water Treatment Verification," *Society for Laboratory Automation and Screening*, January 2014, San Diego CA.
26. R. Kebriaei and **A.S. Basu**, "Inline Label-Free Protein Detection Using Interfacial Tension," *Society for Laboratory Automation and Screening*, January 2014, San Diego CA.
27. G.K. Kurup and **A.S. Basu**, "Deterministic Protein Extraction from Droplets Using Interfacial Drag and Tensiophoresis," *Micro Total Analysis Systems (MicroTAS)*, October 2013, Freiburg Germany. (**Oral Presentation, 8.7% acceptance rate from 1178 submissions**). PDF.
28. R. Kebriaei and **A.S. Basu**, "Autosizing Closed Loop Droplet Generator Using Morphometric Image Feedback," *Micro Total Analysis Systems (MicroTAS)*, October 2013, Freiburg Germany. (**Oral Presentation, 8.7% acceptance rate from 1178 submissions**). PDF.
29. G.K. Kurup and **A.S. Basu**, "Size Based Droplet Sorting with Wide Tuning Range Using Tensiophoresis," *Micro Total Analysis Systems (MicroTAS)*, October 2013, Freiburg Germany. PDF.
30. K.M. Dadesh and **A.S. Basu**, "A 40 MHz Frequency Multiplexed Electronic System for Multicolor Droplet Flow Cytometry," *Micro Total Analysis Systems (MicroTAS)*, October 2013, Freiburg Germany. PDF.
31. A. Bulbul, **A.S. Basu**, and H. Kim, "Characterization of Microbubbles of Multiple Gases in Microfluidic Channels," *Micro Total Analysis Systems (MicroTAS)*, October 2013, Freiburg Germany. PDF.
32. G.K. Kurup and **A.S. Basu**, "Passive, Label- Free Droplet Sorting based on Chemical Composition using Tensiophoresis," *Micro Total Analysis Systems (MicroTAS)*, October 2012, Okinawa Japan. (**Oral Presentation, 8.1% Acceptance rate from 1210 submissions**). PDF.
33. G.K. Kurup and **A.S. Basu**, "Field-Free Particle Segregation and Extraction for Bead-Based Assays in Plugs," *Micro Total Analysis Systems (MicroTAS)*, October 2012, Okinawa Japan. PDF.
34. G.K. Kurup and **A.S. Basu**, "Indirect Particle Manipulation using a Scanning Optofluidic Tweezer," *Micro Total Analysis Systems (MicroTAS)*, October 2012, Okinawa Japan. PDF.
35. **A.S. Basu**, "Droplet Tracking Velocimetry: Automated, High Throughput Measurement of Droplet Motion Using Image Processing," *Micro Total Analysis Systems (MicroTAS)*, October 2012, Okinawa Japan. PDF.
36. D. Chandrasekar, B. Arnetz, P. Levy, and **A.S. Basu**, "Plug-and-Play, Single-Chip Photoplethysmography," *IEEE Engineering in Medicine and Biology*, August 2012, San Diego, CA. (**Oral Presentation, 15% Acceptance rate**). DOI.
37. G.K. Kurup and **A.S. Basu**, "Tensiophoresis: Migration and Sorting of Droplets in an Interfacial Tension Gradient," *Micro Total Analysis Systems (MicroTAS)*, October 2011, Seattle WA. (**Oral Presentation, 7.4% acceptance from 1251 submissions**). PDF.
38. G.K. Kurup and **A.S. Basu**, "Optofluidic Tweezers: Manipulation of Oil Droplets with 10^5 Greater Force than Optical Tweezers," *Micro Total Analysis Systems (MicroTAS)*, October 2011, Seattle WA. PDF.
39. K.M. Dadesh and **A.S. Basu**, "Multicolor LIF detection in a Single Optical Window Using Phase-Sensitive Multiplexing," *Micro Total Analysis Systems (MicroTAS)*, October 2011, Seattle WA. PDF.

40. P. Sehgal, A. Doshi, and **A.S. Basu**, “Microfractionation of CE-Separated Compounds into Droplets,” *Micro Total Analysis Systems (MicroTAS)*, October 2011, Seattle WA. PDF.
41. S. Hamed, B. Shay, and **A.S. Basu**, “Capillary Fractionation of HPLC Substrates by a Microfluidic Droplet Generator for High Throughput Analysis,” *IEEE Engineering in Medicine and Biology (EMBS)*, September 2011, Boston MA. (**Oral presentation, 15% acceptance**). DOI.
42. T. Mertiri, M. Chen, A. Hundich, T. Holland, and **A.S. Basu**, “Optical Microplates for Photonic High Throughput Screening of Algal Photosynthesis and Biofuel Production”, *IEEE Engineering in Medicine and Biology (EMBS)*, September 2011, Boston MA. (**Oral presentation, 15% acceptance**). DOI.
43. K. Dadesh and **A.S. Basu**, “High Speed Low-Noise Multiplexed Three Color Absorbance Photometry,” *IEEE Engineering in Medicine and Biology (EMBS)*, pp. 39-42, September 2011, Boston MA. DOI.
44. G.K. Kurup and **A.S. Basu**, “Shape Dependent Laplace Vortices in Deformed Liquid-Liquid Slug Flow,” *IEEE Engineering in Medicine and Biology (EMBS)*, September 2011, Boston MA. DOI.
45. G.K. Kurup and **A.S. Basu**, “Rolling, Aligning, and Trapping Droplets on a Laser Beam using Marangoni Optofluidic Tweezers,” *Intl. Conference on Sensors, Actuators, and Microsystems (Transducers)*, June 2011, Beijing China. DOI.
46. G.K. Kurup and **A.S. Basu**, "Hydrodynamic Particle Concentration in a Microfluidic Plug," *Micro Total Analysis Systems (MicroTAS)*, pp 740-742, Oct. 2010, Groningen, The Netherlands. (**Oral presentation, 10% acceptance from 1140 submissions)**. PDF.
47. G.K. Kurup and **A.S. Basu**, "Multispectral Absorbance Photometry with a Single Light Detector Using Frequency Division Multiplexing," *Micro Total Analysis Systems (MicroTAS)*, pp. 1268-1270, Oct. 2010, Groningen, The Netherlands. PDF.
48. Doshi, V. Trivedi, P. Sehgal, and **A.S. Basu**, "Digital Chromatography and the Formation of Heterogeneous Droplet Libraries using Microfractionation in Droplets (µFD)," *Micro Total Analysis Systems (MicroTAS)*, Nov. 2009, Jeju, Korea. (**Oral presentation, 6.4% acceptance from 1031 submissions**). PDF.
49. V. Trivedi, E.S. Ereifej, A. Doshi, P. Sehgal, P.J. VandeVord, and **A.S. Basu**, "Microfluidic Encapsulation of Cells in Alginate Capsules for High Throughput Screening," *IEEE Engineering in Medicine and Biology Conference (EMBC)*, pp. 7037-40, Sept. 2009, Minneapolis, MN. (**Oral presentation, 15% acceptance rate**). DOI.
50. K. Visvanathan, F. Shariff, S.Y. Yee, and **A.S. Basu**, "Propulsion and Steering of a Floating Mini-Robot Based on Marangoni Flow Actuation," *Intl. Conference on Sensors, Actuators, and Microsystems (Transducers)*, pp. 1293 – 1296, June 2009, Denver, Colorado. DOI.
51. **A.S. Basu** and Y.B. Gianchandani, "A 128-Bit Digitally Programmable Microfluidic Platform for Non-Contact Droplet Actuation Using Marangoni Flows," *Intl. Conference on Sensors, Actuators, and Microsystems (Transducers)*, pp. 771-774, June 2007, Lyon, France. DOI.
52. **A.S. Basu**, Seow Yuen Yee, and Y.B. Gianchandani, "Virtual Components for Droplet Control Using Marangoni Flows: Size-Selective Filters, Traps, Channels, and Pumps," *IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, pp. 401-404, Jan. 2007, Kobe, Japan. DOI.
53. S. Mutlu, **A.S. Basu**, and Y.B. Gianchandani, "Maskless Electrochemical Patterning of Gold Films for BioSensors Using Micromachined Polyimide Probes," *IEEE Conference on Sensors*, Nov. 2005, Irvine, CA, pp. 1173-1177. DOI.
54. **A.S. Basu** and Y.B. Gianchandani, "Microthermal Techniques for Mixing, Concentration, and Harvesting DNA and Other Microdroplet Suspensions," *Micro Total Analysis Systems*, Oct. 2005, Boston, MA, pp. 131-135. PDF.
55. **A.S. Basu** and Y.B. Gianchandani, "Trapping and Manipulation of Particles and Droplets Using Micro-Toroidal Convection Currents," *Intl. Conference on Solid State Sensors, Actuators, and Microsystems (Transducers)*, June 2005, Seoul, Korea, pp. 85-88. (**Oral presentation, 10% acceptance**). DOI.
56. **A.S. Basu** and Y.B. Gianchandani, "High Speed Microfluidic Doublet Flow in Open Pools Driven by Non-Contact Micromachined Thermal Sources," *IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, Jan. 2005, Miami Beach, FL, pp 666-669. DOI.
57. **A.S. Basu**, S. McNamara, and Y.B. Gianchandani, "Maskless Lithography by Patterned Heating of Photoresist Using Ultracompliant Thermal Probe Arrays," *Electron, Ion, Photon Beam Technology and Nanofabrication (EIPBN)*, May 2004, San Diego, CA, pp. 109- 111. (**Oral presentation, 10% acceptance**). PDF.
58. S. McNamara, **A.S. Basu**, and Y.B. Gianchandani, "Ultracompliant, Passively Decoupled Thermal Probe Arrays: Large Area Mapping of Non-Planar Surfaces Without Force Feedback," *IEEE International Conference. on Micro Electro Mechanical Systems (MEMS)*, Jan. 2004, Maastricht, The Netherlands, pp. 825-828. (**Oral presentation, 6.5% acceptance**). DOI.

Thesis

1. **A.S. Basu**, Microthermal Devices for fluidic Actuation by Modulation of Surface Tension. *Ph.D. Thesis*, University of Michigan, August 2008. PDF.

Patents

1. **A.S. Basu**, B.W. Bramlett, "Microfluidic Information-Encoding Polymer Data Storage," US Patent application, Intel Corporation, January 2017. Status: pending
2. **A.S. Basu**, B.W. Bramlett, N.L. Dabby, L.O. Hernandez, "Wearable Assay System and Method of Use," US Patent application, Intel Corporation, Filed Dec 8th, 2016. Status: pending
3. D. Snyder, **A.S. Basu**, and R.G. Cooks, "Systems and Methods for Separating Ions at About or Above Atmospheric Pressure," US Patent application 62/288,082, Purdue Research Foundation, filed January 2017. Status: pending.
4. **A.S. Basu** and G. Kamalaksakurup, "Optofluidic Tweezers," US Patent US8944084, Wayne State University, Feb 3, 2015. Status: granted. URL.
5. **A.S. Basu**, "Sensor and Method for Continuous Health Monitoring," US Patent application WO2013148753, Wayne State University, March 28th, 2012. Status: pending. URL.
6. **A.S. Basu**, "Device and method for optimizing photobiological processes," US Patent application number WO2013033080, Wayne State University, August 29, 2011. Status: pending. URL.
7. A. Gaitas and **A.S. Basu**, "Lab on a Pipette," US Patent number US8394625, Picocal Inc., March 12, 2013. Status: granted. URL.
8. B. Mitra, A. Gaitas, **A.S. Basu**, and W. Zhu, "Scanning Probe Assisted localized CNT growth," US Patent US8192809, Picocal Inc., June 5th, 2012. Status: granted. URL.
9. Y. B. Gianchandani, and **A.S. Basu**, "Marangoni Convection Driven by Micro-Scale Thermal Sources, and its Application to Single Molecule Detection," U.S. Patent 7358051, University of Michigan, April 15, 2008. Status: granted. URL.
10. Y.B. Gianchandani, S.P. McNamara, J. Lee, and **A.S. Basu**, "Micromachined Thermal Probe Apparatus, System for Thermal Scanning a Sample in Contact Mode, and Cantilevered Reference Probe for Use Therein," U.S. Patent 7073938, University of Michigan, July 11, 2006. Status: granted. URL.
11. M.S. McCorquodale, S. Pernia, and **A.S. Basu**, "Frequency calibration for a monolithic clock generator and timing/frequency reference," U.S. Patent 7248124, Mobius Microsystems, July 24, 2007. Status: granted. URL.
12. M.S. McCorquodale, S. Pernia, and **A.S. Basu**, "Monolithic clock generator and timing/frequency reference," U.S. Patent 7227423, Mobius Microsystems, Jun 5, 2007. Status: granted. URL.

Invited Talks/Presentations

1. A.S. Basu, "Wearable sensors for continuous health monitoring," Wearable Health Care Technology Symposium, *Integrative Biosciences Institute*, Detroit MI April 2017.
2. A.S. Basu, "Microfluidics in Mass spectrometry," Purdue University Center for Analytical Instrument Development (CAID), West Lafayette IN, September 2016.
3. A.S. Basu, "Wearable sensors for continuous health monitoring," Intel Corporation, San Jose CA, March 2015.
4. A.S. Basu, "High Throughput Screening in Droplets," Intel Corporation, Santa Clara CA, February 2016.
5. A.S. Basu, "High Throughput Screening in Droplets," Purdue University, West Lafayette IN, December 2015.
6. A.S. Basu, "Wearable sensors for continuous health monitoring," Henry Ford Medical Symposium on Wireless Health, Detroit MI, May 2015.
7. A.S. Basu, "An Ultraminiature Heart Rate Sensor for continuous health monitoring," IEEE Southeast Michigan Conference, April 2015.
8. "High Throughput Screening in Droplets," Sandia National Labs, Livermore CA July 2014.
9. "Unit operations in Droplet Microfluidics," Micro & Nano Fluidics Session at the Nanotech 2014 Conference, Washington DC, June 2014.
10. "High throughput Biology in Droplet Microreactors," Medical MEMS 2014, Detroit MI, May 2014.
11. "Analytical Chemistry in Droplet Microreactors," University of Memphis, April 2014.
12. "Fluid handling operations in droplet microreactors: optical tweezing, sorting, particle segregation, and label free sensing in picoliter volumes," Society for Laboratory Automation and Screening, San Diego CA, January 2014.

13. "Fluid handling operations in droplet microreactors: optical tweezing, sorting, particle segregation, and label free sensing in picoliter volumes," NIH/NIBIB Microfluidics in Biomedical Sciences Training Program (MBSTP), Ann Arbor MI, March 26th 2013.
14. "Microfluidic and Electronic Technologies for High Throughput Screening," Michigan State University Electrical Engineering Seminar, Lansing MI, February 21st 2013.
15. "Multiphase Computational Fluid Dynamics for Droplet-based Microfluidics," National Nanotechnology Infrastructure Network Computational (NNIN/C) Webinar Series, January 29th 2013.
16. "Microfluidic and Electronic Technologies for High Throughput Screening," Central Michigan University, Wayne State University, October 2011.
17. "Multiphase Computational Fluid Dynamics for Droplet-based Microfluidics," National Nanotechnology Infrastructure Network (NNIN) Workshop on Advanced Modeling of NEMS/MEMS and Nano/Microfluidic Devices, University of Michigan Center for Wireless Integrated Microsystems (WIMS), April 22nd, 2011.
18. "Microfluidic and Electronic Technologies for High Throughput Screening," Institute of Environmental and Health Sciences, Wayne State University, March 2011.
19. "Microfluidic and Electronic Technologies for High Throughput Screening," Wayne State University Department of Pharmacological Sciences, February 2011.
20. "Microfluidic and Electronic Technologies for High Throughput Screening," Wayne State School of Medicine, June 2010.
21. "Microfluidic Science and Technology," Biomedical Engineering/Biomedical Physics, Wayne State University, February 2011.
22. "High throughput chemical screening," Ford Research and Development Center, Dearborn MI, Feb 2010.
23. "Microdroplet systems for high throughput screening," Wayne State University Physics Seminar, Fall 2009.
24. "Programmable droplet based microfluidics," National Institute of Standards and Technology, Gaithersburg MD, February 2008
25. "Programmable droplet based microfluidics," Sandia National Laboratories, Livermore CA, March 2008
26. "MEMS for military applications," US Army TARDEC, Warren MI, March 2008

Graduate Students Mentored

1. Sameer Alshehri, Ph.D. ECE ongoing, *Electrophoretic desalination of water.*
2. Priyan Weerappuli, Ph.D. BME ongoing, *High throughput microfluidic computers using droplets.*
3. Arpith Vedhanayagam, M.S. ECE ongoing, *Real-time particle and droplet image velocimetry.*
4. Aishwarya Mandhare, M.S. ECE ongoing, *Wearable heart rate sensor for interval training.*
5. Ridhima Soni, M.S. ECE ongoing, *Digital detection of organisms in ballast water for prevention of invasive species.*
6. Anoorag Sunkari, M.S. ECE ongoing, *Low power firmware for beat-to-beat heart rate sensor.*
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