

Waseem Asghar, Ph.D.

Assistant Professor

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According to the World Health Organization (WHO), more than 35 million people are living with HIV and more than 1.5 million died of AIDS. HIV has become one of the most devastating pathogens in human history causing 25 million deaths and it remains the leading cause of death in Africa. More than 95 percent of HIV infections are in developing countries, two-thirds of them in sub-Saharan Africa, where 28 million people are living with HIV. Although antiretroviral therapy (ART) is effective in saving AIDS patients' lives, the implementation of ART worldwide has been drastically hampered by the lack of treatment monitoring diagnostics and disease management. According to WHO 2013 guidelines, the coverage of ART is still only 34 percent of 28.6 million ART eligible people in low- and middle-income countries, despite ART being affordable or even freely available in these countries. The fundamental challenges to reduce HIV burden and its prevalence include difficulties in motivating people to learn their HIV status, and the lack of point-of-care (POC) assays for viral load and CD4 cell counts in rural areas having limited access to basic laboratory infrastructure and trained technicians. This disease is having a major socioeconomic impact on impoverished countries, where screening for HIV and laboratory personnel are scarce. To increase access to HIV care and to improve treatment outcomes, there is an urgent need to develop an inexpensive, robust, and disposable biosensing platforms for viral load and CD4 quantification as well as for opportunistic pathogens which can cause infections due to reduced immunity in AIDS' patients.

Waseem Asghar, Ph.D., Assistant Professor of Electrical Engineering in the College of Engineering and Computer Science at Florida Atlantic University has identified new paper and flexible material-based diagnostic biosensing platform that could be used to remotely detect and determine treatment options for HIV, E-coli, Staphylococcus aureas and other bacteria. Using a drop of blood from a fingerprick, this novel biosensing platform provides clinically relevant specificity, sensitivity and detection of pathogens from whole blood and plasma. Using paper and flexible substrates as materials for biosensors, Dr. Asghar and his collaborators identified a new rapid and cost-effective way to diagnose diseases and monitor treatment in point-of-care settings.

Paper and flexible material-based platform technologies have created an exciting avenue in the area of point-of-care diagnostics. These technologies have also potential to shift the paradigm in developing diagnostic assays, particularly for the developing world, as they are thin, light, flexible, inexpensive, and materials are readily available around the world. These platforms are easy-to-fabricate, mass-producible, easy-to-use, and disposable. Paper-based platforms can also absorb fluid samples through capillary effect, and be incinerated for convenient and safe disposal. Therefore, these platforms provide attractive strategies for developing affordable tools with broad applications such as drug development, water and environment quality monitoring, and infectious diseases diagnosis in resource-constrained settings.

Using this technology, he also has developed a phone app that could detect bacteria and disease from a drop of blood using images from a cellphone that could easily be analyzed from anywhere in the world.

Dr. Asghar employed three different paper and flexible material-based platforms incorporated with electrical and optical sensing modalities. He has been able to show how the new platforms are uniquely

able to isolate and detect multiple biotargets selectively, sensitively, and repeatedly from diverse biological mediums using antibodies. Current paper and flexible material-based platforms have limitations, use colorimetric, fluorometric and electrochemical approaches that require complex labeling steps to amplify their signal, are very costly to fabricate and also require expensive equipment and infrastructure. The paper-based technology developed by Dr. Asghar costs less than \$1, and users can capture results at the point-of-care and transmit images via smartphone app to hospitals for immediate diagnosis. Dr. Asghar has integrated cellulose paper and flexible polyester films as new diagnostic tools to detect bioagents in whole blood, serum and peritoneal fluid. He was able to demonstrate how these new materials can be widely applied to a variety of settings including medical diagnostic and biology laboratories.

Because the microchips developed by Dr. Asghar are easy to make, easy to use, and can easily and safely be disposed by burning, they provide appealing strategies for developing affordable tools that have broad applications such as drug development, food safety, environmental monitoring, veterinary medicine and diagnosing infectious diseases in developing countries. These paper microchip technologies can potentially have a significant impact on infectious diseases management in low- and middle-income countries and could potentially be adapted and tailored to detect other pathogens and biotargets with well-known biomarkers.

The future of diagnostics and health monitoring will have potentially cell-phone based or portable readers sipping saliva or blood and continuously monitoring human health taking it to levels far beyond the counting steps method used today.

Dr. Asghar has published his work in highly prestigious journals in the field of micro- and nano-technologies, including *Nature Scientific Reports*, *Nano Today*, *Materials Today*, *Lab-Chip*, *Advanced Healthcare Materials*, and *Nanotechnology*. His research has been featured on journal covers of *Lab-Chip* (twice), *IEEE Nanotechnology* (twice), and *Analytical Methods*. His research work has received excellent media attention and was recognized by many premier magazines including *Newsweek*, *Wired UK*, *Popular Science*, *Sciencedaily*, and *Engadget* along with many others. He has been invited by various TV news channels to talk about his research including West Palm Beach NBC TV (WPTV), and Fort Lauderdale/Miami WPLG ABC TV news. He also has been invited to talk about biosensors on a live radio program, "Doctor's Radio, NY". The honors and recognition he has received prove his successful track record in applying forefront technologies to problems in disease diagnostics and focusing on disposable microchips for the point-of-care and bedside applications.

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Waseem Asghar

eRA COMMONS USER NAME (credential, e.g., agency login): WASGHAR

POSITION TITLE: Assistant Professor, Department of Computer Engineering & Electrical Engineering and Computer Science, and Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
University of Engineering and Technology, Lahore, Pakistan	B.S.	09/07	Electrical Engineering
University of Texas at Arlington, TX	Ph.D.	05/12	Bioengineering
Research Fellow, Harvard Medical School, Brigham and Women's Hospital, Boston MA	Research Fellow	04/14	Point-of-Care Diagnostics, Microfluidics, cell Sorting, HIV for Global Health, Bio-MEMS
Research Fellow, Stanford School of Medicine, Palo Alto, CA	Research Fellow	08/14	HIV/AIDS, Global Health

A. Personal Statement

Our laboratory specializes in applying micro- and nano-scale techniques to problems in medicine. Our laboratory is located at Florida Atlantic University Boca Raton campus at the interface of College of Engineering and The Charles E. Schmidt College of Medicine. We have developed rapid, portable, quantitative microchips for pathogen detection from unprocessed human samples. We have years of expertise on cell capture from whole blood with high efficiency and specificity. Through my career I have obtained training in a number of disciplines that are of direct importance for leading this project including experience in a variety of engineering and biomedical disciplines including bioengineering, infectious diseases, microfabrication, microfluidics, cell sorting, tissue engineering, and biopreservation. I have recognized the importance of communication among the members of a project and hold weekly team meetings, where I am closely involved. I have been successful in encouraging frequent communication between project members within my own laboratory, with other labs on campus and across institutions within and outside South Florida area. The importance of my work to the bioengineering field is exemplified by being awarded the FAU Faculty Mentoring Award, IEngage Mentoring Fellowship, Nanofab Best Graduate Student Award, and STEM Fellowship. I have published my work in highly prestigious journals in the field of micro- and nano-technologies, including Nature Scientific Reports, Nano Today, Materials Today, Lab-Chip, Advanced Healthcare Materials, and Nanotechnology. My research has been featured on journal covers of Lab-Chip (twice), IEEE Nanotechnology (twice), and Analytical Methods.

My research work has received excellent media attention and was recognized by many premier magazines including Newsweek, Wired UK, Popular Science, Sciencedaily, and Engadget alongwith many others. I have been invited by various TV news channels to talk about my research including West Palm Beach TV (WPTV), and WPLG news. I have also been invited to talk about biosensors on a live radio program, "Doctor's Radio, NY". The honors and recognition I have received prove my successful track record in applying forefront technologies to problems in disease diagnostics and focusing on disposable microchips for the point-

of-care and bedside applications. I have mentored and/or co-mentored 7 graduate, and 4 undergrad students over the past 5 years, who have continued to successful careers. Currently, I am mentoring 3 graduate, and 7 undergraduate students at Florida Atlantic University.

B. Positions and Honors

Positions and Employment:

2008-2012 Research Assistant, University of Texas at Arlington, TX
2012-2014 Research Fellow, Harvard Medical School, Brigham and Women's Hospital, and Harvard-MIT Health Sciences and Technology Division (HST), Cambridge, MA
2014-2014 Research Fellow, Stanford School of Medicine, Palo Alto, CA
09/2014- Assistant Professor, Computer Engineering & Electrical Engineering and Computer Science, Florida Atlantic University, Boca Raton, FL
05/2015- Assistant Professor, Biological Sciences Department (Joint Appointment), Florida Atlantic University, Boca Raton, FL

Selected Honors:

2008-2012 Research Fellowship, University of Texas, TX
2008-2012 STEM Fellowship, University of Texas, TX
2009-2011 Consortium for Nanomaterials for Aerospace Commerce and Technology (CONTACT) Award
2011 IEngage Mentoring Fellowship
2012 Nanofab Best Graduate Student Award
2013 Epilepsy Therapy Project's Shark Tank Competition (1st out of 67 teams), Member of the Winning Team
2013 BRight Future Prize, Brigham and Women's Hospital, Member of the Winning Team
2015 Best Poster Award at Annual GPSA Research Day
2015 Faculty Research Mentoring Award, Florida Atlantic University

Other Experience and Professional Memberships:

2013-2014 Mentor for MIT Undergrad Research Opportunity Program (UROP)

Organizer and Chair for special session "Smart Phone based Health Diagnostics and Monitoring (SP-Health)" collocated with EAI International Conference on Wireless Mobile Communication and Healthcare - "Transforming healthcare through innovations in mobile and wireless technologies" (Mobi-health 2015), 2015, Oct., 14-16, London, UK

Guest Editor of "*Micro and Nanosystems (MNS)*" for special issue on "*Microfluidics and Nanotechnology for Diagnostics and Biomedical Applications,*" (2011-2012)

Steering Committee Member: IEEE Workshop on Advances in Body-Centric Wireless Communications and Networks and Their Applications (BCWNets 2015) In conjunction with The 11th International IEEE Conference on wireless and mobile computing, networking and communication (WIMOB 2015), Oct., 19-21, 2015, Abu Dhabi, UAE

Professional Membership: Biomedical Engineering Society (BMES) – 2012, IEEE Engineering in Medicine and Biology Society (EMBS) – 2014, American Physical Society (APS) – 2011, Sigma Xi – 2011

Reviewer for Lab on a Chip, Analytical Methods, Biomaterials, Analyst, Chemical Communication, RSC Advance, Journal of Bioanalysis & Biomedicine, and Journal of Nanoscience and Nanotechnology

C. Contribution to Science

1. Isolation of cells of interest, bacteria, and viruses using microfluidics: Recent technological advances in Lab on a Chip and microfluidics provide new tools to precisely isolate cells and biological agents in micro/nano-liter volumes. These microfluidic platforms offer several advantage over lab-based techniques;

microfluidic platforms are inexpensive, disposable, require only a fingerprick of blood, and can rapidly isolate viruses and cells at the point-of-care settings. I have developed various microfluidic-based platforms for precise isolation and quantification of HIV viruses, E-coli, and cells of interest including CD4+, Cancer, and Sperm cells.

- a. Shafiee, H., **Asghar, W.**,* Inci, F., Yuksekkaya, M., Jahangir, M., Zhang, M.H., Durmus, N.G., Gurkan, U.A., Kuritzkes, D.R., Demirci, U. "Paper and flexible substrates as materials for biosensing platforms to detect multiple biotargets" *Nature Scientific Reports*, 2015;5. PMID: PMC4351531 (* Equal Contribution)
- b. Wan, Y., Liu, Y., Allen, P.B., **Asghar, W.**, Mahmood M.A., Tan J., Duhon, H., Kim, Y.T., Ellington, A.D., Iqbal, S.M. Capture, Isolation and Release of Cancer Cells using Aptamer-Functionalized Glass Bead Array. *Lab on a Chip*, 2012. 12(22), 4693-1407. PMID: PMC3498495. (Cover Article)
- c. **Asghar, W.**, Velasco, V., Kingslye, J.L., Shoukat, M.S., Shafiee, H., Anchan, R.M., Mutter, G.L., Tuzel, E., and Demirci, U. Selection of Functional Human Sperm with Higher DNA Integrity and Fewer Reactive Oxygen Species. *Advanced HealthCare Materials*, 2014; 3(10), 1671-1679. PMID: PMC4194169.
- d. M. Islam, **W. Asghar**, Y.-T. Kim and S. M. Iqbal, "Microfluidic Filtration for Label-Free Detection of Circulating Tumor Cells," *British Journal of Medicine and Medical Research*, vol. 4, no. 11, pp. 2129-2140, (2014)

2. Electro-physio-elastic detection of circulating tumor cells: Early stage detection and precise quantification of circulating tumor cells (CTCs) in the peripheral blood of cancer patients are important for early diagnosis and disease management. Several techniques have been used for CTC detection but are limited by their need for dye tagging, low throughput, and lack of statistical reliability at single cell level. I took an untraditional route to detect cancer cells based on their mechanical properties. Mechanical properties of the cells like elasticity, size, viscosity, deformability, and stiffness stem from the cytoskeleton, which is an internal polymer network. Tumor cells differ from normal cells in various aspects, including morphology, cell growth, cell-to-cell interactions and cytoskeletal organization. Changes to cellular functions and morphology of these diseased cells are mirrored in the cytoskeleton. Consequently, the diseased cells exhibit mechanical behaviors, which indicate the physiological status of the cells and can be used as inherent cell markers for the discrimination of cancerous cells. I have developed a novel micropore-based label-free biosensor to efficiently discriminate cancer cells from other cells (RBCs, WBCs, healthy cells) based on their physio-elastic properties. More than 85% CTCs show distinct electrical pulses.

- a. **Asghar, W.**, Wan, Y., Ilyas, A., Kim, Y.-t., and Iqbal, S.M. Electrical Fingerprinting, 3D Profiling and Detection of Tumor Cells with Solid-state Micropores. *Lab on a Chip*, 2012; 12(13), 2345-2352. PMID: 22549275. (Cover Article)
- b. Ilyas, A., **Asghar, W.**, Kim, Y.T., and Iqbal, S.M. Parallel Recognition of Cancer Cells using Addressable Array of Solid-state Micropores. *Biosensors and Bioelectronics*, 2014; 62:343-9. PMID: 25038540
- c. Ilyas, A., **Asghar, W.**, Kim, Y.T., and Iqbal, S.M. Electrophysiological Analysis of Biopsy Samples using Elasticity as an Inherent Cell Marker for Cancer Detection. *Analytical Methods*, 2014; 6(18), 7166-7174. (Cover Article)

3. Development of label-free nano-biosensors for protein and DNA analysis: Nanopores have emerged as sensors for single molecule detection and these have been employed to examine the biophysical properties of an increasingly large variety of biomolecules. Nanopores allow DNA analysis with sub-nanometer resolution without the need for labels or amplification. Recent advances suggest that nanopore-based sensors could be competitive with other third-generation DNA sequencing technologies, and may be able to rapidly and reliably sequence the human genome for under \$1,000. One of the major limitations in nanopore-based genetic sequencing is the high velocity of the DNA/RNA as it passes through the pore. I have developed a method to precisely control the surface functional groups on the nanopore surface which

can slow down the DNA during translocation. Reducing DNA velocity inside a nanopore is a step ahead towards making nanopore-based DNA sequencing possible. In the area of label-free protein detection, I have developed a method to rapidly fabricate nano-breakjunctions which are used for ultrasensitive protein/Ab detection. Using aptamers as target binding moieties, we have shown that proteins can be efficiently detected using this label-free technology.

- a. **Asghar, W.**, Ilyas, A., Deshmukh, R.R., Sumitsawan, S., Timmons, R.B., Iqbal, S.M. Pulsed Plasma Polymerization for Controlling Shrinkage and Surface Composition of Solid-state Nanopores. *Nanotechnology*, 2011; 22(28), 285304. PMID: 21636880.
- b. Ilyas, A., **Asghar, W.**, Allen, P.B., Duhon, H., Ellington, A.D., and Iqbal, S.M. Electrical Detection of Cancer Biomarker using Aptamers with Nanogap Break-Junctions. *Nanotechnology*, 2012; 23(27), 275502. PMID: PMC3404891.
- c. **Asghar, W.**, Ilyas, A., Billo, J., and Iqbal, S.M. Shrinking of Solid-state Nanopores by Direct Thermal Heating. *Nanoscale Research Letters*, 2011; 6(1), 372. PMID: PMC3211463.
- d. **Asghar, W.**, Ramachandran, P. P., Adewumi, A., Noor, M.R., and Iqbal, S.M. "Rapid Nanomanufacturing of Metallic Break Junctions Using Focused Ion Beam Scratching and Electromigration," *Journal of Manufacturing Science and Engineering, Special Issue on Nanomanufacturing*, 2010; 132(3), 030911

4. Review manuscripts: I have prepared review articles in the area of disease diagnostics, human cell preservation for regenerative medicine, and 3D tumor models for cancer microenvironment studies.

- a. **Asghar, W.**, Assal, R.E., Shafiee, H., Pitteri, S., Paulmurugan, R., and Demirci, U. "Engineering cancer microenvironments for in vitro 3-D tumor models", *Materials Today*, 2015; Accepted DOI: 10.1016/j.mattod.2015.05.002, 2015.
- b. Wang, L.,* **Asghar, W.**,* Demirci, U., and Wan, Y. Nanostructured Substrates for Isolation of Circulating Tumor Cells. *Nano Today*, 2013; 8(4), 374-387. PMID: PMC4059613. (*Equal Contribution)
- c. **Asghar, W.**, Assal, R.E., Shafiee, H., Anchan, R.M., and Demirci, U. Preserving human cells for regenerative, reproductive, and transfusion medicine. *Biotechnology Journal*, 2014; 9(7). PMID: PMC4145864.

Complete List of Published Work in MyBibliography:

A list of my publications can be found on PubMed at

<http://www.ncbi.nlm.nih.gov/sites/myncbi/waseem.asghar.1/bibliography/48546253/public/?sort=date&direction=ascending>

D. Research Support

N/A

Publications - Waseem Asghar, PhD.

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Peer Reviewed Journal Publications:

1. **W. Asghar***, R. EL Assal*, H. Shafiee, S. Pitteri, R. Paulmurugan, and U. Demirci#, "Engineering cancer microenvironments for in vitro 3-D tumor models", *Materials Today*, vol 18, no. 10, (* Equal Contribution, # Corresponding Authors) (2015)
2. H. Shafiee*, **W. Asghar***, F. Inci*, M. Yuksekkaya, M. Jahangir, M. H. Zhang, N.G. Durmus, U.A. Gurkan, D. R. Kuritzkes, and U. Demirci, "Paper and flexible substrates as materials for biosensing platforms to detect multiple biotargets," *Scientific Reports*, 5, (2015) (* Equal Contribution)
3. **W. Asghar**, V. Velasco, J.L. Kingslye, M.S. Shoukat, H. Shafiee, R.M. Anchan, G.L. Mutter, E. Tuzel, and U. Demirci, "Selection of functional human sperm with higher DNA integrity and fewer reactive oxygen species," *Advanced HealthCare Materials*, (2014)
4. **W. Asghar**, R.E. Assal, H. Shafiee, R.M. Anchan, and U. Demirci, "Preserving human cells for regenerative, reproductive, and transfusion medicine," *Biotechnology Journal*, vol. 9, no. 7, (2014)
5. A. Ilyas, **W. Asghar**, Y.T. Kim and S. M. Iqbal, " Parallel Recognition of Cancer Cells using Addressable Array of Solid-state Micropores," *Biosensors and Bioelectronics*, (2014)
6. A. Ilyas, **W. Asghar**, Y.T. Kim and S.M. Iqbal, "Electrophysiological Analysis of Biopsy Samples using Elasticity as an Inherent Cell Marker for Cancer Detection," *Analytical Methods*, (2014) Selected for Cover Article
7. M. Islam, **W. Asghar**, Y.-T. Kim and S. M. Iqbal, "Microfluidic Filtration for Label-Free Detection of Circulating Tumor Cells," *British Journal of Medicine and Medical Research*, vol. 4, no. 11, pp. 2129-2140, (2014)
8. L. Wang*, **W. Asghar***, U. Demirci, and Y. Wan, "Nanostructured Substrates for Isolation of Circulating Tumor Cells," *Nano Today*, vol 8, no. 4, pp. 374-387 (2013) (* Equal Contribution)
9. A. Ilyas, M. Islam, **W. Asghar**, J. U. Menon, A. S. Wadajkar, K. T. Nguyen, S. M. Iqbal, "Salt-leaching Synthesized Porous PLGA Nanoparticles show Enhanced Drug Release," *IEEE Transactions on Nanotechnology*, vol 12, no.6 (2013) Selected for Cover Article
10. **W. Asghar**, Y. Wan, A. Ilyas, Y.-t. Kim and S. M. Iqbal, " Electrical Fingerprinting, 3D Profiling and Detection of Tumor Cells with Solid-state Micropores," *Lab on a Chip*, vol 12, no. 13, pp. 2345-2352, (2012), Selected for Cover Article
11. **W. Asghar**, Y.-t. Kim, A. Ilyas, J.S. Sankaran, Y. Wan, and S.M. Iqbal, "Synthesis of Nano-Textured Biocompatible Scaffolds from Chicken Eggshell," *Nanotechnology*, vol 23, no. 47, pp. 475601 (2012)
12. A. Hafeez*, **W. Asghar***, M. M. Rafique, S. M. Iqbal and A. R. Butt, "GPU-based Real-time Detection and Analysis of Biological Molecules using Solid-State Nanopores," *Journal of*

Medical & Biological Engineering & Computing, vol 50, no. 6, pp. 605-615 (* Equal Contribution) (2012)

13. **W. Asghar**, M. Islam, A.S. Wadajkar, Y. Wan, A. Ilyas, K.T. Nguyen and S. M. Iqbal, "PLGA Micro- and Nanoparticles Loaded into Gelatin Scaffold for Controlled Drug Release," IEEE Transactions on Nanotechnology, vol 11, no. 3, pp. 546-553, (2012), Selected for Cover Article
14. Y. Wan, Y. Liu, P.B. Allen, **W. Asghar** et al., "Capture, Isolation and Release of Cancer Cells using Aptamer-Functionalized Glass Bead Array," Lab on a Chip, vol 12, no. 22, pp. 4693-1407, (2012) Selected for Cover Article
15. **W. Asghar**, "Editorial: Microfluidics and Nanotechnology for Diagnostics and Biomedical Applications," Micro and Nanosystems, vol 4, no. 4 (2012)
16. J. A. Billo, J. Jones, **W. Asghar**, R. L. Carter and S. M. Iqbal, "Viscosity and Surface-Free Energy Effects in Thermal Shrinking of Solid-State Nanopores," Applied Physics Letters (APL), vol 100, no. 23, pp. 233107 (2012)
17. A. Ilyas, **W. Asghar**, A.D. Ellington, and S.M. Iqbal, "Electrical Detection of Cancer Biomarker using Aptamers with Nanogap Break-Junctions," Nanotechnology, vol. 23, no. 27, pp. 275502 (2012)
18. Y. Wan, J. Tan, **W. Asghar**, Y.-t. Kim, Y. Liu and S. M. Iqbal, "Velocity Effect on Aptamers-based Circulating Tumor Cell Isolation in Microfluidic Devices," Journal of Physical Chemistry B, vol 115, no. 47, (2011)
19. **W. Asghar**, A. Ilyas, R. R. Deshmukh, S. Sumitsawan, R. B. Timmons and S. M. Iqbal, "Pulsed Plasma Polymerization for Controlling Shrinkage and Surface Composition of Solid-state Nanopores," Nanotechnology, vol. 22, no. 28, 285304 (8pp) (2011)
20. **W. Asghar**, A. Ilyas, J. Billo and S.M. Iqbal, "Shrinking of Solid-state Nanopores by Direct Thermal Heating," Nanoscale Research Letters, vol. 6, no.1, pp. 372 (2011)
21. S.D. Divya, **W. Asghar** and S. M. Iqbal, "Porous Organic Nanolayers for Coating of Solid-state Devices," Journal of Nanobiotechnology, vol. 9, no. 18 (2011)
22. **W. Asghar**, P. P. Ramachandran, A. Adewumi, M. R. Noor and S. M. Iqbal, "Rapid Nanomanufacturing of Metallic Break Junctions Using Focused Ion Beam Scratching and Electromigration," Journal of Manufacturing Science and Engineering, Special Issue on Nanomanufacturing, vol. 132, no. 3, pp 030911-1-4 (2010)
23. A.Ramachandran, Y. Liu, **W. Asghar**, and S. M. Iqbal, "Characterization of DNA-Nanopore Interaction by Molecular Dynamics," American Journal of Biomedical Sciences, Volume 1, no. 4, pp.344-351 (2009)

In Review

24. **W. Asghar**, M. Yuksekkaya, H. Shafiee, M. Zhang, M. Kocakulak, and U. Demirci, "Refrigeration free, long term microfluidic device packaging for disease diagnostics and global health applications," In Review (2014)

Refereed Conference Proceedings (Full Papers)

1. **W. Asghar**, A. Ilyas, R. B. Timmons and S. M. Iqbal, "Fabrication of Charged Nanopore Channels using Pulsed Plasma Deposition of Methacrylic Acid," in *Proc. of IEEE 11th International Conference on Nanotechnology (IEEE Nano)* Portland, OR, USA (August 15-18, 2011) doi:10.1109/NANO.2011.6144512
2. S. D. Vidyala, **W. Asghar** and S. M. Iqbal, "Biocompatible Nanolayered Polymerization of MEMS Devices," in *Proc. of 33rd Annual International IEEE EMBS Conference*, Boston, MA, USA (August 30-September 3, 2011) doi:10.1109/IEMBS.2011.6090799
3. A. Ilyas, **W. Asghar**, Ehsan A. Q. Syed and S. M. Iqbal, "From Molecular Electronics to Proteonics: Break Junctions for Biomarker Detection," in *Proc. of IEEE-NIH Life Science Systems and Applications Workshop 2011 (IEEE LiSSA'11)*, Bethesda, MD, USA, pp. 79-82 (April 7-8, 2011) doi:10.1109/LISSA.2011.5754160
4. J. Billo, **W. Asghar** and S. M. Iqbal, "An Implementation for the Detection and Analysis of Negative Peaks in an Applied Current Signal across a Silicon Nanopore," in *Proc. SPIE* 8031, 80312T (2011) doi:10.1117/12.884088
5. **W. Asghar**, P. Ramachandran and S. M. Iqbal, "Integrating Engineering and Biology for Bio-Nanotechnology Curriculum," in *Proc. of 40th ASEE/IEEE Frontiers in Education Conference (FIE)*, Arlington, VA, USA, pp. T2F-1 to T2F-6 (October 27–30, 2010), doi:10.1109/FIE.2010.5673126

Refereed Conference Proceedings (Abstracts)

1. **W. Asghar**, M. Yuksekkaya, M. Zhang, H. Shafiee, U. Demirci, "Flexible Microfluidics for CD4+ T-Cell Capture and Counting", *IEEE EMBS Micro and Nanotechnology in Medicine Conference*, Oahu, Hawaii, USA (December 8-12, 2014)
2. **W. Asghar**, V.R. Sah, H. Shafiee, V. Velasco, A. Rajagopalan, M. Jahangir, R.M. Anchan, G.L. Mutter, M. Ozkan, C. Ozkan, and U. Demirci, "Toxicology of Carbon Based Nano-materials on Human Sperm: A Concentration and Time Dependent Study", *Graphene and Related Technologies*, Istanbul, Turkey (October 13-14, 2014)
3. **W. Asghar**, A. Hafeez, A.R. Butt, and S.M. Iqbal, "Lab on Chip Platform Integrated with Graphics Processing Units for Real-time Detection of Tumor Cells", *Biomedical Engineering Society 2012 Annual Meeting (BMES)*, Atlanta, Georgia, USA (October 24-27, 2012)
4. **W. Asghar**, A. Hafeez, C.M.A. Arafat, A.R. Butt, and S.M. Iqbal, "Real-time Detection, Clustering and Analysis of Micropore Cell Translocation Data with Commercial Graphics Processor", *US-Korea Joint Symposium of Nanotechnology Workshops (JSNT)*, Grapevine, Texas, USA (May 1-4, 2012) <http://tinyurl.com/ccpk6xb>
5. A. Ilyas, M.J Bari, **W. Asghar**, and S.M. Iqbal, "Nano-electrode Break-junctions for Electrical Detection of Cancer Biomarkers", *US-Korea Joint Symposium of Nanotechnology Workshops (JSNT)*, Grapevine, Texas, USA (May 1-4, 2012) <http://tinyurl.com/ccpk6xb>
6. C.A. Arafat, S.D. Vidyala, **W. Asghar** and S.M. Iqbal, "Eco-friendly Deposition of Fluorinated Nanocomposites," at *International Conference on Materials Science and its Applications*, Taif, Saudi Arabia (Feb 13-15, 2012) <http://tinyurl.com/7ef557t>

7. Y. Wan, **W. Asghar**, P. B. Allen, A. D. Ellington, Y.-t. Kim and S. M. Iqbal, "Circulating Tumor Cells in Microfluidic Devices - Parameters to Increase Isolation Efficiency," at *Cancer Detection and Diagnostics Technologies for Global Health Conference*, Bethesda, MD (August 22-23, 2011) <http://tinyurl.com/73u3t4k>
8. **W. Asghar**, A. Ilyas, R.B. Timmons and S.M. Iqbal, "Polymerization of Nanopores for Controlled Surface Charges," *American Physical Society Meeting (APS)*, Dallas, TX, USA (March 2011) <http://tinyurl.com/887lol7>
9. S. D. Vidyala, **W. Asghar** and S. M. Iqbal, "Nanotextured Organic Polymer Film for Coating MEMS Devices," at *27th Southern Biomedical Engineering Conference (SBEC)*, Arlington, TX, USA (Apr 29-May 1, 2011) <http://tinyurl.com/d5ny83b>
10. **W. Asghar**, A. Ilyas, S. Sumitsawan, R. B. Timmons and S. M. Iqbal, "Controlled Shrinking of Nanopores with in situ Surface Functionalization," at *27th Southern Biomedical Engineering Conference (SBEC)*, Arlington, TX, USA (Apr 29-May 1, 2011) <http://tinyurl.com/d5ny83b>
11. J. Billo, **W. Asghar** and S. M. Iqbal, "Heat Treatment to Shrink Solid-State Nanopores," *American Physical Society Meeting (APS)*, Dallas, TX, USA (March 2011) <http://tinyurl.com/6ngfzg2>
12. R. A. Khan, **W. Asghar**, A. Arafat, Y. Wan, S.M. Iqbal, "Classification of Cells using Solid-state micropores," *ACES symposium*, TX, USA (March 23-24, 2011) <http://tinyurl.com/75mhfcz>
13. R. A. Khan, **W. Asghar**, Y. Wan, and S. M. Iqbal, "Single Pore System for Classification of Cells," at *Biomedical Engineering Society 2010 Annual Meeting (BMES)*, Austin, TX, USA (October 6-9, 2010) <http://tinyurl.com/7shkqdh>
14. **W. Asghar**, A. Ilyas, P. Ramchandran, M.R. Noor and S.M. Iqbal, "Nano-manufacturing of Gold Break Junctions Fabricated with Focused Ion Beam Scratching and Electro-migration," *ACES symposium*, TX, USA (March 25, 2010) <http://tinyurl.com/894ef4a>
15. **W. Asghar**, S.M. Iqbal, "Biomarker Detection Using Solid State Nanopores", *UT MetroPlex Day*, Arlington, TX, USA (March 6, 2009) <http://tinyurl.com/85knp87>
16. **W. Asghar**, S.M. Iqbal, "Solid State Nanopores for Single Molecule Sensing & DNA Analysis," *ACES Workshop*, Arlington, TX, USA (March 26, 2009) <http://tinyurl.com/7s3tkmj>

Book Chapters:

1. **W. Asghar**, H. Shafiee, P. Chen, S. Tasoglu, S. Guven, U.A. Gurkan, U. Demirci, "In vitro three-dimensional cancer culture model", in '*Cancer targeted drug delivery: Elusive dream*' (Edited by You Han Bae, Randall Mrsny, Kinam Park), Springer, NY, USA (2013).p.xx
2. **W. Asghar**, J. Billo and S.M. Iqbal "Solid-state nanopores for selective sensing of DNA," in '*Nanopores: Sensing and Fundamental Biological Interactions*' (Edited by R. Bashir, S.M. Iqbal); ISBN: 978-1-4419-8251-3, Springer, NY, USA (2011) <http://tinyurl.com/6soozry>

Patents / IP Disclosure:

1. Demirci, U., **Asghar, W.**, "System and Method for Sperm Sorting", Pub. No.: WO/2015/077333 International Application No.: PCT/US2014/066405; (2015)
2. Iqbal, SM., Ilyas, A., **Asghar, W.**, and Kim, YT., "Solid-state Micropore Biosensor for High Throughput Cell Typing, Discrimination and Disease Detection," IP Disclosure filed, (2014).
3. Iqbal, SM., **Asghar, W.**, and Ilyas, A., "Novel, Rapid and Inexpensive Synthesis of Nano-textured Scaffolds from Chicken Eggshells," IP Disclosure filed, (2011).

Invited Talks / Seminars:

1. W. Asghar, "Smart Devices for Disease Management," Seminar to Industry Advisory Board, Computer Engineering & Electrical Engineering and Computer Science Department, Florida Atlantic University, April 03, 2014
2. W. Asghar, "Micro And Nanoscale Devices for Disease Diagnostics And Management," Seminar to Industry Advisory Board, Computer Engineering & Electrical Engineering and Computer Science Department, Florida Atlantic University, December 05, 2014
3. W. Asghar, "Point-of-Care (POC) Devices for Disease Management," Seminar to Biomedical Engineering Society, Florida Atlantic University, September 29, 2014
4. W. Asghar, "Integrating Materials and Technology for Diagnostics," Seminar to Tissue Engineering Students, Florida Atlantic University, September 24, 2014
5. W. Asghar, and U. Demirci "Potential Applications of Microfluidic Methods to Sort Fresh and Frozen Sperm," 2014 World Forum on Biology, Savannah, Georgia, June 2014
6. W. Asghar, "Nano and Microscale Platforms for Disease Diagnostics and Monitoring," Florida Atlantic University, Boca Raton FL, April 2014
7. W. Asghar, " Solid-state Devices for Disease Management," University of Georgia, Athens Georgia, April 2014
8. W. Asghar, "Biosensors for Disease Diagnostics", Florida Institute of Technology, Melbourne FL, March 2014
9. W. Asghar, "Development of BioMEMS based Technologies for Infectious Diseases", Rowan University, Glassboro, NJ, March 2014
10. W. Asghar, "Nano-devices and Lab on a Chip Platforms for Smart Biosensing", King Abdullah University of Science and Technology, Thuwail Saudi Arabia, May 2013
11. W. Asghar, "Nano-electronic Platforms for Electrical Sensing of Bio-Molecules", Tennessee Tech University, Cookeville TN, June 2012
12. W. Asghar, "Lithographic Nanofabrication for Bio-diagnostics and Nanoelectronic Applications", Department of Electrical Engineering, Northern Illinois University, DeKalb IL, April 2012
13. W. Asghar, "Solid-state Devices for Detection of DNA, Protein Biomarkers and Cells", Harvard-MIT Health Sciences and Technology, Harvard Medical School, Cambridge, MA, March 2012

14. W. Asghar, "Electrical Detection of Biomolecules using Solid-state Devices", Intel Corporation, Hillsboro, OR USA, September 2011
15. W. Asghar, A. Ilyas, R. B. Timmons and S. M. Iqbal, "Fabrication of Charged Nanopore Channels using Pulsed Plasma Deposition of Methacrylic Acid," IEEE 11th International Conference on Nanotechnology, Portland, OR, August 2011
16. W. Asghar, A. Ilyas, R.B. Timmons and S.M. Iqbal, "Polymerization of Nanopores for Controlled Surface Charges," American Physical Society Meeting (APS), Dallas, TX, March 2011
17. W. Asghar, P. Ramachandran and S. M. Iqbal, "Integrating Engineering and Biology for Bio-Nanotechnology Curriculum," ASEE/IEEE Frontiers in Education Conference, Arlington, VA, October 2010
18. W. Asghar, "Nano-Bio: Challenges, Trends and Opportunities", Sole Speaker Seminar Series at University of Engineering and Technology, Faisalabad, National University of Computer and Emerging Sciences, FAST Lahore, and University of Agriculture Faisalabad, May 2009