BIOGRAPHICAL SKETCH

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NAME: Javanmard, Mehdi

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

POSITION TITLE: Associate Professor

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)	END DATE MM/YYYY	FIELD OF STUDY
Georgia Institute of Technology, Atlanta, GA	BS	05/2002	Electrical and Computer Engineering
Stanford University, Stanford , CA	MS	06/2004	Electrical Engineering
Stanford University, Stanford, CA	PHD	09/2008	Electrical Engineering

A. Personal Statement

My background is in electrical engineering and I am Co-Principal Investigator on this project. I have a broad background in Electrical Engineering, with specific training and expertise in microfluidics and development of biosensors. My research interests lie in the use of bioMEMS and microfluidics technology for health and environmental monitoring. Namely I'm interested in developing non-invasive techniques for monitoring inflammation. As a PhD student, I worked on developing a technique based on the use of protein functionalized microfluidic channels for label free electrical detection of target cells, protein biomarkers, protein-protein interactions, and DNA hybridization. For all of the applications demonstrated, my technique was as sensitive as fluorescent based techniques while several orders of magnitude cheaper in price. As an Assistant and then Associate Professor at Rutgers University, my focus has been on developing tools for enabling on-demand health monitoring through continuous biomarker quantification, environmental monitoring, and the effects of environment on physiology. In late 2018, I co-founded the company Rizlab Health, Inc. with the goal of commercializing the impedance cytometry technology that was developed in my lab. I will be on sabbatical starting in January 2021 for one year to work fully on Rizlab Health. The main work, which is relevant to the proposed study, is my recent publication in developing electronically barcoded micro-particles along with portable and wearable impedance cytometers [1-5]. This paper demonstrates the proof-of-concept and shows the feasibility of our proposed study. 1. Z. Lin, S.Y. Lin, P. Xie, C.Y. Lin, G.M. Rather, J.R. Bertino, and M. Javanmard, 2020. Rapid Assessment of Surface Markers on cancer cells Using immuno-magnetic Separation and multi-frequency impedance cytometry for targeted therapy. Scientific Reports (Nature Publishing Group). 10, 1, (2020). 2. K. Ahuja, G. M. Rather, Z. Lin, J. Sui, P. Xie, T. Le, JR. Bertino, M. Javanmard. Toward point-of-care assessment of patient response: a portable tool for rapidly assessing cancer drug efficacy using multi-frequency impedance cytometry and supervised machine learning. Microsystems & Nanoengineering (Nature publishing group). 5, 1 (2019). 3. Xie P, Cao X, Lin Z, Javanmard M. Top-down fabrication meets bottom-up synthesis for nanoelectronic barcoding of microparticles. Lab on a Chip. 17,1939 (2017). 4. Furniturewalla A, Chan M, Sui J, Ahuja K, Javanmard M. Fully integrated wearable impedance cytometry platform on flexible circuit board with online smartphone readout. Microsystems & Nanoengineering (Nature Publishing Group). 4, 20 (2018). 5. J. Mok, M. Mindrinos, R. W. Davis, M. Javanmard, "Digital Microfluidic Assay for Protein Detection", Proceedings of the National Academy of Sciences,111, 2110-2115 (2014).PMCID: PMC3926080

1. Mahmoodi SR, Xie P, Zachs DP, Peterson EJ, Graham RS, Kaiser CRW, Lim HH, Allen MG, Javanmard M. Single-step label-free nanowell immunoassay accurately quantifies serum stress hormones within minutes. Sci Adv. 2021 Jun;7(27) PubMed Central PMCID: PMC8245048.

2. Sui J, Gandotra N, Xie P, Lin Z, Scharfe C, Javanmard M. Multi-frequency impedance sensing for detection and sizing of DNA fragments. Sci Rep. 2021 Mar 22;11(1):6490. PubMed Central PMCID: PMC7985362.
3. Xie P, Song N, Shen W, Allen M, Javanmard M. A ten-minute, single step, label-free, sample-to-answer assay for qualitative detection of cytokines in serum at femtomolar levels. Biomed Microdevices. 2020 Oct 10;22(4):73. PubMed PMID: 33037941.
4. Sui J, Xie P, Lin Z, Javanmard M. Electronic classification of barcoded particles for multiplexed detection using supervised machine learning analysis. Talanta. 2020 Aug 1;215:120791. PubMed PMID: 32312428.

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2019 -	Associate Professor, Rutgers University
2018 -	Chief Executive Officer and Co-Founder, RizLab Health, Princeton, NJ
2014 - 2019	Assistant Professor, Rutgers University
2009 - 2014	Senior Research Engineer, Stanford University School of Medicine
2008 - 2009	Postdoctoral Fellow, Stanford University School of Medicine

Honors

2020	DARPA Young Faculty Award Winner, DARPA
2019	NSF CAREER Award, National Science Foundation
2016	PhRMA Foundation Starter Award for Young Faculty, PhRMA Foundation,

C. Contribution to Science

1. My earlier contributions to the field of biosensing involved the use of electronic microfluidic based diagnostic tools for detection of cellular biomarkers, nucleic acid biomarkers, and protein biomarkers. All of the above mentioned techniques were faster in speed compared gold standard fluorescent assays, at least one order of magnitude lower in price, and equivalent in sensitivity. Here is a list of the publications.

    a. Javanmard M, Davis RW. A microfluidic platform for electrical detection of DNA hybridization. Sens Actuators B Chem. 2011 May 20;154(1):22-27. PubMed Central PMCID: PMC3607642.
    b. Javanmard M, Babrzadeh F, Davis RW. Microfluidic force spectroscopy for characterization of biomolecular interactions with piconewton resolution. Appl Phys Lett. 2010 Oct 25;97(17):173704. PubMed Central PMCID: PMC2988830.
    c. Javanmard M, Talasaz AH, Nemat-Gorgani M, Huber DE, Pease F, Ronaghi M, Davis RW. A Microfluidic Platform for Characterization of Protein-Protein Interactions. IEEE Sens J. 2009 Aug;9(8):883-891. PubMed Central PMCID: PMC2868195.
    d. Javanmard M, Talasaz AH, Nemat-Gorgani M, Pease F, Ronaghi M, Davis RW. Electrical detection of protein biomarkers using bioactivated microfluidic channels. Lab Chip. 2009 May 21;9(10):1429-34. PubMed Central PMCID: PMC2778468.

2. Another set of my publications involved a novel sensing modality focused on improving detection limit of protein biomarker assays, and also increasing throughput to perform multiplexed analysis. We demonstrated wearable impedance cytometry, portable impedance cytometry, and also its application in detection of cancer cells and also label-free DNA quantification.

    a. Sui J, Gandotra N, Xie P, Lin Z, Scharfe C, Javanmard M. Multi-frequency impedance sensing for detection and sizing of DNA fragments. Sci Rep. 2021 Mar 22;11(1):6490. PubMed Central PMCID: PMC7985362.

b. Lin Z, Lin SY, Xie P, Lin CY, Rather GM, Bertino JR, Javanmard M. Rapid Assessment of Surface Markers on Cancer Cells Using Immuno-Magnetic Separation and Multi-frequency Impedance Cytometry for Targeted Therapy. Sci Rep. 2020 Feb 20;10(1):3015. PubMed Central PMCID: PMC7033175.
c. Furniturewalla A, Chan M, Sui J, Ahuja K, Javanmard M. Fully integrated wearable impedance cytometry platform on flexible circuit board with online smartphone readout. Microsyst Nanoeng. 2018;4:20. PubMed Central PMCID: PMC6220260.
d. Talukder N, Furniturewalla A, Le T, Chan M, Hirday S, Cao X, Xie P, Lin Z, Gholizadeh A, Orbine S, Javanmard M. A portable battery powered microfluidic impedance cytometer with smartphone readout: towards personal health monitoring. Biomed Microdevices. 2017 Jun;19(2):36. PubMed PMID: 28432532.

3. One other set of my publications involved a novel sensing modality focused on improving detection limit of protein biomarker assays, and also increasing throughput to perform multiplexed analysis. In this work, we were able to demonstrate at least one order of magnitude improvement in sensitivity compared to sandwich immunoassays, and also we performed 16-plex multiplexing involving the use of enhanced dielectrophoresis, which is 100X stronger than regular dielectrophoresis. This work can be summarized in this set of publications.

a. Emaminejad S, Dutton RW, Davis RW, Javanmard M. Multiplexed actuation using ultra dielectrophoresis for proteomics applications: a comprehensive electrical and electrothermal design methodology. Lab Chip. 2014 Jun 21;14(12):2105-14. PubMed Central PMCID: PMC4097078.
b. Mok J, Mindrinos MN, Davis RW, Javanmard M. Digital microfluidic assay for protein detection. Proc Natl Acad Sci U S A. 2014 Feb 11;111(6):2110-5. PubMed Central PMCID: PMC3926080.
c. Emaminejad S, Javanmard M, Dutton RW, Davis RW. Microfluidic diagnostic tool for the developing world: contactless impedance flow cytometry. Lab Chip. 2012 Nov 7;12(21):4499-507. PubMed Central PMCID: PMC3495618.
d. Javanmard M, Emaminejad S, Dutton RW, Davis RW. Use of negative dielectrophoresis for selective elution of protein-bound particles. Anal Chem. 2012 Feb 7;84(3):1432-8. PubMed Central PMCID: PMC3278233.