
BIOGRAPHICAL SKETCH

NAME Pourrezaei, Kambiz	POSITION TITLE Professor, School of Biomedical Engineering, Science and Health Systems, Drexel University		
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Tehran University, Tehran, Iran	B.S.	1974	Electrical Engineering
Tufts University, Medford, Massachusetts	M.S.	1976	Electrical Engineering
Rensselaer Polytechnic Inst., Troy New York	Ph.D.	1982	Electrical Engineering

A. Personal Statement

Bio-Optics. For more than a decade Professor Pourrezaei has been working in the area of Bio Optics in collaboration with the late Professor Britton Chance who is one of the pioneers of fNIR technology. As part of this effort, Dr Pourrezaei has initiated two major activities related to Bio Optics in the School of Biomedical Engineering, Sciences and Health Systems at Drexel University. One Initiative has been the development of fNIR technology for monitoring cognitive activities. The second activity involves the use of fNIR for monitoring wound healing. So far these activities have led to three start ups, Infrascan. Inc (www.infrascanner.com), fNIR Devices, LLC(www.fnirdevices.com) and a new startup related to the use of fNIR for monitoring wound healing.

Bio-Nanotechnology. In 1999 Dr. Pourrezaei started a regional nanotechnology initiative in Philadelphia , PA. As a result of his efforts, in the year 2000, a State of Pennsylvania sponsored Nanotechnology Institute(NTI) was established in the Philadelphia region. Since then, NTI has received over \$22.5 million dollars from the State of Pennsylvania. The NTI (www.nanotechinstitute.org) main focus has been to promote nanotechnology among the Greater Philadelphia region universities and industries. In particular the focus of NTI has been to promote commercialization of Bio-Nanotechnology. As a result of the NTI activities over 200 patent applications have been filed and 15 start ups have been created. Specifically Dr. Pourrezaei has led the Biosensor activities of NTI. Several Biosensor modalities have been developed and resulted in patent applications and start up companies.

Biomedical Technology Development. Recently Dr. Pourrezaei has started a new concentration for the master degree students and a certificate for the working engineers in the area of “Biomedical Technology Development” BTD. The main goal of the BTD concentration is to train students or working engineers to learn as how to design a new medical device. This BTD concentration/certificate emphasizes all aspects of development of a new medical device from innovation to commercialization and in particular to the design, human interface, and the FDA approval processes.
(<http://www.drexel.edu/catalog/certificates/biomedical-technology.htm>).

B. Positions and Honors

Positions and Employment

1982-1987	Assistant Professor, Department of Electrical & Computer Engineering Drexel University, Philadelphia, PA,
1988-1998	Associate Professor, Department of Electrical & Computer Engineering Drexel University, Philadelphia, PA
1998-2001	Professor, Department of Electrical & Computer Engineering

2001- Professor, School of Biomedical Engineering and Health Sciences Drexel University,
Philadelphia, PA
2000 Chair of the Faculty Senate

Other Experience and Professional Memberships

2001- 2011 CO-Director of Nanotechnology Institute, Philadelphia, PA
1985 -1987 President of American Vacuum Society, Delaware Chapter
1983- 1987 Visiting Resident Bell Laboratory
2009-2011 CEO of US Biogistics
Members of IEEE, AVS, MRS, BMES, SPIE

Patents

1. "Urinary Catheter and System" U.S. Patent 5,295,979, March 22, 1994
2. "Method for Fabrication of Metallized Medical Devices" U.S. Patent 5,685,961, November, 11, 1997
3. "Detection of Defects in Protective Barriers" U.S. Patent 6,204,669, February 19, 1997
4. Deception detection and Query methodology for determining deception via neuroimaging, US 8,346,331, January 2013
5. "Surface Enhanced Raman Scattering (SERS) Substrates from Silver Films" Just approved

Patents - Applied and Pending

1. "Non-invasive Combinatorial Screening of Inflammation"
2. "Surface Enhanced Raman Scattering (SERS) Substrates from Silver Films"
3. "Functional Near Infrared Spectroscopy as a Monitor for Depth of Anesthesia"
4. "Changes in Optical Properties of Tissue During Acute Wound Healing in an Animal Model"

C. Selected Peer-reviewed Publications

PEER REVIEWED PUBLISHED ARTICLES (SELECTED)

1. Ebraheem Sultan, Laleh Najafizadeh, Amir Ganjbaghcheh, **Kambiz Pourrezaei**, and Afshin Daryoush "Accurate optical parameter extraction procedure for broadband near-infrared spectroscopy of brain matter." *J Biomed Opt* 18(1):17008 (2013),
2. Z Barati, P.A. Shewokis, M Izzetoglu, R Polikar, G Mychaskiw, and **K Pourrezaei**. "Hemodynamic response to repeated noxious cold pressor tests: a near infrared spectroscopy study on forehead", *The Annals of Biomedical Engineering*, 2012
3. M Figueroa, **K Pourrezaei** and S Tyagi. "Microwave monitoring of silver nanoparticle sintering for surface-enhanced Raman scattering substrates." *Journal of Raman Spectroscopy*. vol 43 (4) p 588-591, 2012.4.
4. M Figueroa, **K Pourrezaei** and S Tyagi. "Fabrication of flexible and porous surface enhanced Raman scattering (SERS) substrates using nanoparticle inks." *AIP Conference Proceedings*, vol 1461 p 47-53, 2012.
5. M Figueroa, S Schraer, **K Pourrezaei** and S Tyagi. "Surface-enhanced Raman scattering and microwave absorption in silver nanoparticle inks." *Plasmonics in Biology and Medicine IX, SPIE Proceedings* vol 8234, 2012.
6. Bunce, S., Izzetoglu, K., Izzetoglu, M., Ayaz, H., **Pourrezaei, K.**, Onaral, B. (2012) Treatment Status Predicts Differential Prefrontal Cortical Responses to Alcohol and Natural Reinforcer Cues among Alcohol Dependent Individuals, International Conference on Brain Inspired Cognitive Systems, July 11-14, 2012, Shenyang, China. doi: 10.1007/978-3-642-31561-9_20
7. Izzetoglu, K., Ayaz, H., Merzagora, A., Izzetoglu, M., Shewokis, P. A., Bunce, S. C., **Pourrezaei, K.**, Rosen, A., Onaral, B. (2011) The evolution of field deployable fNIR spectroscopy from bench to clinical settings, *Journal of Innovative Optical Health Sci.*, Vol. 4, No. 3 p 1-12.
8. L Loo, JA Capobianco, W Wu, X Gao, WY Shih, WH Shih, **K Pourrezaei**, MK Robinson and GP Adams. "Highly Sensitive Detection of HER2 Extracellular Domain in the Serum of Breast Cancer Patients by Piezoelectric Microcantilevers". *Anal. Chem.*, 83 (9), pp 3392-3397, 2011.
9. Accelerating Innovation: The Nanotechnology Institute
A Green, E Chen, **K Pourrezaei**, M Marcolongo, R Carpick

Nanotechnology Law & Business 176, (Fall 2011)

10. L Loo, W Wu, WY Shih, WH Shih, H Borghaei, **K Pourrezaei** and GP Adams. "A Rapid Method to Regenerate Piezoelectric Microcantilever Sensors (PEMS)". *Sensors* 11(5), 5520-5528, 2011.
11. M Figueroa, **K Pourrezaei** and S Tyagi, "Detection of hyaluronic acid on a functionalized surface enhanced Raman scattering substrate." Proceedings of the 37th IEEE Northeast Bioengineering Conference, Troy, NY. April 2011.
12. M. Neidrauer, L. Zubkov, M.S. Weingarten, **K. Pourrezaei**, E.S. Papazoglou, "Near Infrared Wound Monitor Helps Clinical Assessment of Diabetic Foot Ulcers," *Journal of Diabetes Science and Technology*, 4(4):792-798, 2010.
13. M.S. Weingarten, M. Neidrauer, A. Mateo, X. Mao, J.E. McDaniel, L. Jenkins, S. Bouraee, L. Zubkov, **K. Pourrezaei**, E.S. Papazoglou, "Prediction of Wound Healing in Human Diabetic Foot Ulcers by Diffuse Near Infrared Spectroscopy: A Pilot Study," *Wound Repair and Regeneration*, 18:180-185, 2010.
14. M. Figueroa, W. Stephenson, **K. Pourrezaei** and S. Tyagi, "Characterization of surface enhanced Raman scattering (SERS) substrates fabricated from colloidal printing inks", *Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications*, SPIE Proceedings vol 7576, 2010.
15. JP McGovern, WH Shih, RF Rest, M Purohit, M Mattiucci, **K Pourrezaei**, B Onaral, and WY Shih. "Array lead zirconate titanate/glass piezoelectric microcantilevers for real-time detection of *Bacillus anthracis* with 10 spores/ml sensitivity and 1/1000 selectivity in bacterial mixtures", *Rev Sci Instrum* 80(12): 125104, 2009.
16. E.S. Papazoglou, M. Neidrauer, L. Zubkov, M.S. Weingarten, **K. Pourrezaei**, "Non-invasive assessment of diabetic foot ulcers with diffuse photon density wave methodology: A pilot human study," *Journal of Biomedical Optics*, 14(6): 064032-064032-10, 2009.
17. J. Leon-Carrion, J. Francisco Martín-Rodríguez, J. Damas-López, **K. Pourrezai**, K. Izzetoglu, J. Barroso and M. Rosario Dominguez-Morales "Does dorsolateral prefrontal cortex (DLPFC) activation return to baseline when sexual stimulicease? The role of DLPFC in visual sexual stimulation" *Neuroscience Letters*, 2007 Apr 6; 416(1):55-60;416(1):55-60
18. E. Papazoglou, L. Zubkov, M. Weingarten, L. Zhu, S. Tyagi, **K. Pourrezaei**, "Optical Properties of Wound Tissue in Diabetic and Healthy Animals", *IEEE, Trans. Biomed. Eng.*, 53(6), 1047-1055, 2006.
19. H. Ayaz, M. Izzetoglu, S. Platek, S. Bunce, K. Izzetoglu, **K. Pourrezaei**, and B. Onaral, "Registering fNIR Data to Brain Surface Image using MRI templates", 28th IEEE EMBS Annual International Conference, 2671-2674, 2006
20. Kriete, E. Papazoglou, B. Edrissi, H. Pais, **K. Pourrezaei**, "Automated Quantification of Q-dot Labeled EGFr Internalization via Multi-Scale Image Segmentation", *Journal of Microscopy*, **222**(1), 22-27 (2006).
21. Bunce S, Izzetoglu M, Izzetoglu K, Onaral B, Pourrezaei K, "Functional Near Infrared Spectroscopy: An Emerging Neuroimaging Modality" *IEEE Engineering in Medicine and Biology Magazine*, Special issue on Clinical Neuroengineering, (2006) 25(4):54 - 62.
22. Q Zhang, R Lec and **K Pourrezaei**, "The Study of an Interaction of Solid Particles with Various Surfaces Using TSM Sensors" *IEEE Transaction on Ultrasonics, Ferroelectrics and Frequency Control*, Vol.53, No. 1, pp. 167-174, 2006.
23. M. Weingarten, E. Papazoglou, L. Zubkov, L. Zhu, **K. Pourrezaei**, G.Vorona, A. Walchak, "Measurement of optical properties to quantify healing of chronic diabetic wounds", *Wound Repair and Regeneration*, 14, 364, May-June 2006.
24. A. Kriete, E. Papazoglou, B. Edrissi, H. Pais, **K. Pourrezaei**, "Automated Quantification of Q-dot Labeled EGFr Internalization via Multi-Scale Image Segmentation", *Journal of Microscopy*, 222(1), 22-27, April 2006.
25. J. Leon-Carrion, J. Damas, K. Izzetoglu, **K. Pourrezaei**, J. Martin-Rodriguez, J. Martin, M. Dominguez-Morales, "Differential time course and intensity of PFC activation for men and women in response to emotional stimuli: A functional near-infrared spectroscopy (fNIRS) study". *Neuroscience Letters*. Volume 403, Issues 1-2, 31 July 2006, Pages 90-95
26. Izzetoglu M, Izzetoglu K, Bunce S, Onaral B, **Pourrezaei K**, (2005). Functional Near-Infrared Neuroimaging. *IEEE Trans. on Neural Systems and Rehabilitation Engineering*, 13(2):153-159.C. Research Support

D. Research Support

Recent Research Support Over \$500,000

State of Pennsylvania

(Original Founder, 2000- Present)

Nanotechnology Institute,

U.S. Army Medical Research and Materiel Command (CO-PI, 2009 – 2012)

Development of Warfighter Cognitive Performance Indices

This research study focuses on development of the cognitive performance indices by establishing an individual's attentional and working memory baselines. Deviations from the established baseline will be assessed by using functional near-infrared (fNIR) spectroscopy.

The Wallace H. Coulter Translational Partners Grant Program (PI, 2009 – Present)

Functional Near-infrared Spectroscopy as a Monitor for Depth of Anesthesia:

The purpose of the study is to introduce a wearable optical brain imaging system to monitor the depth of anesthesia during surgery. Assessment for depth of anesthesia refers to our ongoing studies in measuring level of brain activation of patients under anesthesia in response to stimuli such as sensory effects in operating room (OR), pain, pharmacological agents (opioid), etc.

Recently Completed Research Support

U.S. Army Medical Research and Material Command (CO-PI, 2008 – 2011)

UAV Operator Training and Workload Assessment for Safe Piloting

This research study focuses on: monitor of operator's cognitive workload (CWA) during the mission to increase safety of the UAV operation; an objective measure of expertise development, i.e., transition from novice to expert during operator training; and a brain computer interface (BCI) system will increase the ease of piloting a UAV.

DARPA and Office of Naval Research (PI, 1999 – 2004)

Near Infrared (NIR) Based Functional Optical Brain Imaging Sensor

This study uses fNIR-derived cortical responses in human-computer interface feedback loops during attentional and working memory tasks.

NSF

Partnership Grant (CO-PI, 2001-2003)

Department of Labor

Work Force Training in Nanotechnology (CO-PI, 2002-2003)