



# Invited Talk



## Advanced Medical Ultrasound:

### Beyond Traditional Gray-scale Anatomical Imaging

Dr. Mohammad Mehrmohammadi

Wayne State University and Karmanos Cancer Institute, Detroit, Michigan, USA

**Abstract:** Medical Ultrasound is the most widely used diagnostic imaging modality in clinical practice due to its notable advantages such as being safe (non-ionizing), cost effective, portable, real-time and possessing reasonable imaging contrast and scalable spatial resolution. While traditional gray-scale ultrasound imaging (aka sonography) is a valuable diagnostic tool, efforts have been made to explore further capabilities of ultrasound by introducing breakthrough ultrasound-based modalities that are capable of acquired whole new sets of tissue information from probing events at cellular and molecular levels to assessment of tissue mechanical properties. In this presentation, two major ultrasoundbased functional and cellular/molecular imaging modalities, Photoacoustic imaging and Magneto-motive Ultrasound Imaging, will be introduced. I will present some of our ongoing work on developing a Photoacoustic system for assessing fetal brain oxygenation and developing a novel tomography system for breast cancer imaging. In addition, application of ultrasound in tissue elastography (with an emphasis on shear-wave imaging) will be presented and a few clinical applications including differential diagnosis of breast cancer, thyroid cancer, and non-compliant bladder will be discussed.



**Biography:** Dr. Mehrmohammadi is an assistant professor of Biomedical/Electrical and Computer Engineering at Wayne State University and a scientific member of Molecular Imaging Program at Karmanos Cancer Institute. He received his BS in Electrical Engineering from Sharif University of Technology, MSc in Electrical and Computer Engineering from Illinois Institute of Technology, and PhD in Biomedical/Electrical Engineering from the University of Texas at Austin. He also holds a certificate degree in Nanotechnology from Center of Nano and Molecular Science at UT Austin. Prior to joining WSU, he worked at Mayo Clinic College of Medicine (Rochester, Minnesota) as a Senior Research Fellow where he focused on development and clinical evaluation of various ultrasound-based tissue elastography methods. He is the recipient a number of

research awards such as Newport research excellence award (SPIE 2010), IEEE best paper award finalist (IEEE IUS 2011), and a top-ranked research award from Center for Nano & Molecular Science & Technology at UT Austin. He serves as an associate editor for Medical Physics Journal and is a member of editorial board of Ultrasound in Medicine and Biology, Austin Journal of Biomedical Engineering, and Journal of Biomedical Engineering Research. He also serves a technical committee member for Acoustical Society of America (ASA) and SPIE Medical Imaging conferences. Dr. Mehrmohammadi serves as a reviewer for IEEE TUFFC, IEEE TMI, Nanotechnology, Optics Express, Optics Letters, Photoacoustic, and Cancer Letters. He is a member of institute of Electrical and Electronics Engineers (IEEE, UFFC and EMBS society), International Society for Optical Engineering (SPIE), World Molecular Imaging Society (WMIS), American Association for Cancer Research (AACR), and Sigma Xi.



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مکان: سالن همایش ملاصدرا، دانشکده مهندسی برق دانشگاه علم و صنعت ایران