Laura Marcu, PhD, University of California at Davis, USA

Bio:

Laura Marcu is Professor of Biomedical Engineering and Neurological Surgery at the University of California at Davis. She received her Ph.D. in biomedical engineering in 1998 from the University of Southern California, Los Angeles. Prior of joining UC Davis in 2006, she served as the Director of the Biophotonics Research Laboratory at Cedars-Sinai Medical Center, Los Angeles. Her research interest is in the area of biomedical optics, with a particular focus on research for development of fluorescence lifetime techniques for tissue diagnostics. Her applied research targets solutions for main societal problems including the atherosclerotic cardiovascular disease and cancer. She is a co-editor of the first textbook in "Fluorescence Lifetime Spectroscopy and Imaging: Principles and Applications in Biomedical Diagnostics. She served (2007-2010) on the Board of Directors of the Biomedical Engineering Society in the USA. She is the recipient of a Leverhulme Trust Visiting Professorship at the Imperial College London (Physics). Currently, she serves as Associate Editor for Biomedical Optics Express and as member of the Editorial Board for Journal of Biophotonics. She is an elected Fellow of four prestigious professional societies – the American Institute for Medical and Biological Engineers (AIMBE), the Biomedical Engineering Society (BMES), the Optical Society (OSA), and the International Society for Optics and Photonics (SPIE).

Presentation Title:

Fluorescence lifetime techniques for surgical imaging, guidance and augmented reality

Abstract:

Numerous studies have shown that tissue autofluorescence properties have the potential to asses biochemical features associates with distinct pathologies in tissue and to distinguish various cancers from normal tissues. However, despite these promising reports, autofluorescence techniques have been sparsely adopted in clinics. Moreover, when adopted they were primarily used for pre-operative diagnosis rather than guidance of surgery. This presentation overviews clinically-compatible multispectral fluorescence lifetime imaging techniques developed in our laboratory and their ability to operate as stand-alone tools, integrated in a biopsy needle and in conjunction with the da Vinci surgical robot. We present clinical studies in patients that demonstrate the potential of these techniques for intraoperative assessment of brain tumors and head and neck cancer including image-guided augmented reality in trans-oral robotic surgery (TORS). Challenges and solutions in the clinical implementation of these techniques are discussed.