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### Multimodal *in vivo* imaging strategies for early cancer diagnostics

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Monitoring and diagnostics of many cancers like oral, cervical or esophageal adenocarcinoma often require multimodal approach to perform successful diagnostics. Both morphological imaging and spectral assessment are important tools used in these applications. When, used separately, either method cannot easily achieve both high sensitivity and specificity *in vivo*. On the other hand, if combined and working in tandem, they can significantly improve the diagnostic performance. Therefore, this presentation focuses on analysis of multimodal approaches/instrumentation for early *in vivo* cancer detection. Two groups of devices will be discussed: Miniature-integrated imaging microscopes (endomicroscopes) to provide morphological content and multi and hyperspectral high speed systems to obtain bio-chemical signatures of the tissue. Practical aspects of multi-modal system integration, performance and parameters (field of view and resolution of individual sub-systems) will be discussed together with the design considerations to optimize its effectiveness. Number of imaging methods will be presented including (for morphological assessment): Contact imaging, confocal, structure illumination, and multi-photon imaging and (in area of spectral detection) narrow band imaging (NBI), image mapping spectrometry IMS, array snapshot systems in number of cancer applications (including for example oral, cervical, and esophageal adenocarcinoma).

#### Biography

Tomasz S Tkaczyk received his MS and PhD degrees at Institute of Micromechanics and Photonics, Warsaw University of Technology. Currently, he is an Associate Professor of Bioengineering and Electrical and Computer Engineering at Rice University. He joined Rice University in 2007 after his research at University of Arizona. His research interest includes "Microscopy, endoscopy/*in vivo* pathology, point of care systems, and spectroscopy". He has published 60+ per-reviewed communications. He is a fellow of OSA and SPIE, and recipient of number of professional awards including Paul F. Forman Engineering Excellence Award (OSA), Becton Dickinson Professional Achievement Award (AAMI).

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