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Bio:

Stephen A. Boppart was born in Harvard, IL, in 1968. He received the B.S. degree in electrical and bioengineering and the M.S. degree in electrical engineering from the University of Illinois at Urbana-Champaign, Urbana, IL, in 1990 and 1991, respectively, the Ph.D. degree in electrical and medical engineering from the Massachusetts Institute of Technology, Cambridge, in 1998, and the M.D. degree from Harvard Medical School, Boston, MA, in 2000.

He was a Research Scientist with the Air Force Laser Laboratory, Brooks Air Force Base, San Antonio, TX, where he was engaged in research on developing national (ANSI) and Air Force laser safety standards. Since 2000, he has been with the University of Illinois at Urbana-Champaign, Urbana, from where he completed residency training in internal medicine in 2005. He is currently an Able Bliss Professor of Engineering in the departments of Electrical and Computer Engineering, Bioengineering, and Medicine, the Head of the Biophotonics Imaging Laboratory, Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign, and also the Director of Imaging at Illinois. He has authored or coauthored more than 300 invited and contributed publications, and more than 670 invited and contributed presentations. He holds more than 40 patents, filed or pending. His research interests include the development of novel optical imaging technologies for biological and medical applications, with particular emphasis on translating these to clinical applications.

Dr. Boppart is a Fellow of IEEE, AAAS, OSA, SPIE, and AIMBE. He is also a member of the Biomedical Engineering Society, the American Association for Cancer Research, and the American Medical Association. He was named one of the top 100 innovators in the world by the Technology Review Magazine for his research in medical technology, and received the IEEE Engineering in Medicine and Biology Society Early Career Achievement Award. He received the Paul F. Forman Engineering Excellence Award from the Optical Society of America for dedication and advancement in undergraduate research education, and recently, the international Hans Sigrist Prize for his work in diagnostic laser medicine.

Presentation Title:

Intraoperative Stain-Free Histopathology of Tumor Margins and the Microenvironment using Multimodal Multiphoton Imaging

Abstract:

Label-free multiphoton imaging has been a powerful tool for studying tissue microstructures and biomolecular distributions, particularly for investigating tumors and their microenvironments. In this presentation, a new portable optical source generating shaped supercontinuum pulses from a photonic crystal fiber is introduced, and a portable system is demonstrated for real-time label-free multimodal multiphoton imaging of freshly-resected surgical specimens in the operating room during human breast cancer surgeries. Multimodal imaging revealed tumor-associated exosomes and microvesicles that play critical roles in pre-conditioning the tumor microenvironment for subsequent metastatic invasion. The high-dimensionality of the acquired image data may potentially define new "molecular margins", and will also enable combinatorial and deep learning approaches for new biomarkers and prognostic indicators of disease aggressiveness.