

EE Department Seminar

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Yorgo Istefanopulos Meeting Lounge (KB 217)

Ultrafast Laser Microsurgery Probe

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Ultrafast laser microsurgery has emerged as a remarkable technique for precise ablation of tissue with minimal damage to its surroundings. The combination of this technique with nonlinear optical imaging provides microscopic visualization to guide such surgery in situ. A clinical endoscope capable of image-guided ultrafast laser microsurgery will provide physicians a means for cellular-level microsurgery with the highest precision.

In this talk, I will present a miniaturized fiber-coupled probe for image-guided microsurgery, towards future realization as a clinical endoscope. This development includes delivery of high energy ultrafast laser pulses through an air-core photonic bandgap fiber, laser beam scanning and focusing using an aspheric objective lens. This probe compares favorably over other state-of-the-art endoscopes. The treatment of scarred vocal folds and plasmonic laser nanosurgery for photo-disruption of breast cancer cells have been identified as two novel applications for this probe.

Dr. Onur Ferhanoglu received his B.S and M.S from Bilkent University in 2003 and in 2005, and his Ph.D from Koç University in 2010 respectively, all in Electrical Engineering. After completing his Ph.D., he joined the Femtosecond Laser Assisted Biophotonics Laboratory as a Post-Doctoral Scholar and has been working on developing ultrafast laser endoscopes for nonlinear optical imaging and ablation. His research interests are in the area of biomedical optics and optical microsystems. He has published over 30 research articles in peer-reviewed scientific journals and international conferences. He is a member of SPIE, IEEE and OSA.