THE EMERGENCE OF SUPER RESOLUTION OPTICAL PHOTOTHERMAL INFRARED SPECTROSCOPY AND IMAGING

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Optical Photothermal Infrared (O-PTIR) is a rapidly emerging technique for super-resolution infrared spectroscopy. O-PTIR illuminates a sample with pulses of light from a tunable infrared laser and then uses a shorter wavelength visible probe beam to detect infrared absorption at specific molecular bonds by detecting subtle heating in IR absorbing regions of the sample. Since the probe beam can be focused much smaller than the infrared excitation beam, O-PTIR can achieve spatial resolution 10-30X better than conventional infrared spectroscopy. O-PTIR has been used for a wide variety of biomedical research, including analysis of cells and tissue. O-PTIR has been combined recently with fluorescence imaging to enable the use of fluorescent tags to localize IR spectroscopic measurements, to explore differences in protein secondary structure between normal and diseased tissue related to neurogenerative disease. O-PTIR has also been used for cancer research for the study of microcalcifications in breast cancer and even automated label-free histological recognition of ovarian tissue. O-PTIR has also recently been used for spectroscopic analysis of bacteria, enabling studies of spectroscopic phenotyping, assessing antimicrobial resistance, and single cell metabolic studies. Researchers at Boston University, Purdue, and Photothermal Spectroscopy Corp. have also demonstrated fluorescence-enhanced photothermal infrared spectroscopy (FE-PTIR) in which the absorption of IR light is detected over a wide area by detecting modulations in fluorescent emission from a sample due to local temperature increases in the same due to IR absorption. This presentation will overview O-PTIR and FE-PTIR technology and survey a variety of applications.

Biography

Dr. Mustafa Kansiz is currently the Director of Product Management and Marketing for the mIRage IR Microscope at Photothermal Spectroscopy Corp with responsibilities for new product development, marketing and applications development. He has over 25 years of experience working with FTIR Microscopy and Imaging and Raman, spanning routine to research applications, in both industry and academia. Throughout his time, he has worked at Varian and Agilent Technologies serving in a range of technical and business development roles, including FTIR Microscopy & Imaging Product Manager, Product Specialist, R&D Scientist and European FTIR Sales Manager. He has a Ph.D. from Monash University on biotechnological application of FTIR spectroscopy and multivariate statistics