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Infrared Detector Applications for Safe and Healthy Living

A. G. Unil Perera

Department of Physics and Astronomy
Georgia State University

Abstract:

Infrared detectors and imaging systems are becoming increasingly important in a diverse range of astronomic, military, and civilian applications. In recent years, this field has gained significant attention while incorporating various material combinations and architectures into detector designs with a strong focus on applicability into clinical domains. Here, we will discuss some of our detector structures, their results, and our latest work on disease detection. Our study of the biomedical application of infrared includes exploration of an Affordable, Sensitive, Specific, User-friendly, Rapid, Equipment-free, and Deliverable (ASSURED) diagnostic regimen and testing its clinical feasibility for inflammatory bowel diseases (IBDs) and cancer (Breast, Melanoma, and Lymphoma) screening. Our study using Fourier transform infrared (FTIR) spectroscopy in attenuated total reflectance (ATR) sampling mode, analyzed body fluids to identify reproducible, stable, and statistically significant differences in spectral signatures of the IR absorbance spectra between the control and disease samples. These results show that serum samples can be used to detect the biochemical changes induced by these diseases. This technology can be further developed into a futuristic, noninvasive, personalized diagnostic tool for various diseases in which patient-to-patient differences in molecular signatures would allow the assessment of disease status and personalized drug management.



Short Bio:

Dr. A. G. Unil Perera's pioneering contributions to the infrared detector field, publishing more than 200 referred journal articles, (including 4 edited books, 11 book chapters) and 12 US and International Patents, has bestowed him with high honors from the American Physical Society (Life Fellow- APS), Institute of Electrical and Electronics Engineers

(Fellow – IEEE & IEEE Photonics Society) and Society of Photo-Instrumentation Engineers (Life Fellow SPIE). He is also an Editor of the IEEE Journal of Electron Device Society. He obtained a BS (Physics First class) from U. Colombo, Sri Lanka in 1981, winning the Justin Samarasekara Award for the Most Outstanding Student of the Year. He came to US in 1982 and earned his PhD from the University of Pittsburgh in 1987 and moved to Georgia State University where he won most of the University Awards including the Outstanding Faculty Scholarship Award, Outstanding Faculty Achievement Award, and the Alumni Distinguished Professor Award. At present, he is a Regents' Professor of Physics which is the highest Academic rank in the University System of Georgia. He is also recognized as an IEEE Photonics Society Distinguished Lecturer for 2020- 2022.