

Mid-IR laser imaging for molecular recognition in security and medical applications

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Abstract

Infrasin's Mid IR Imaging Spectroscopy (MIRIS) products are based on hyperspectral imaging under active Mid-IR laser (QCL/ICL) illumination. This allows molecular recognition at trace concentration levels in security applications or minute molecular modifications in medical diagnostic applications. Infrasin's products are portable multi-QCL/ICL standoff mid-IR image-based spectroscopic platform for molecular mapping of trace explosives/narcotics, antibody-free biomolecular fluid and tissue diagnosis, quantitation in drug manufacturing/counterfeit detection, food safety, dopant metrology in semiconductors etc. These standoff detection products map target molecules at distances ranging from six inches to hundreds of meters. Spectrally deconvolved image detection is nearly immediate (10 frames per second), generating results within milliseconds and does not require harvesting of the target particles or detaching them from their surface of origin or any sort of molecular tagging. This unique combination of off-the-shelf components and novel IP allows developing image based sensors for security and medical diagnostic products for multi sector applications. The primary core components are QCLs/ICLs and Long Wavelength IR uncooled microbolometer cameras. An optical multiplexing device that channels the QCL lasers into a single beam, beam conditioning optics and a new high throughput laser despeckling module play vital roles in turning the MIRIS platform into a laser search light capable of detecting molecules or their structural modifications from diffused scattering of the multiplexed laser beam.

Biography

Anadi Mukherjee has over 30 years' experience and leadership roles in R&D relating lasers, photonic materials and devices, optoelectronics, integrated optics – new concepts, fabrication and processing, quantum cascade lasers, trace gas/HAZMAT detection, new biomedical imaging and diagnosis technique. As a Research Assistant Professor at the Center for High Technology materials & EECE Departments at University of New Mexico he initiated new R&D projects in different areas of optoelectronics including Mu-Lasers, very low loss polymeric waveguides and devices etc. Recently as a Senior Scientist at Pranalytica Inc., he developed single-mode tunable external cavity quantum cascade lasers and multiplexed them for multigas detection with high sensitivity and selectivity.