A BIO-MOLECULAR ARCHITECTURAL CONCEPT FOR ENHANCED SENSING OF BIO-SIGNATURES

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Recent research has demonstrated the potential use of terahertz (THz) frequency transmission spectroscopy as a technique for the detection, identification and characterization of biological agents. However, while adequate levels of sensitivity appear to be demonstrated even for remote detection applications, the viability of THz spectroscopy for biological sensing (i.e., point and remote) will ultimately hinge on the level of reliable discrimination it can provide. Two challenges arise within this context. First, there are a reasonably limited number of spectral signatures (i.e., $\lesssim 100$) associated with any bio-agent in its natural state and, second, the strong atmospheric absorption limits the sensitivity of the approach at all but a few THz-band transmission channels. However, it is possible to envision bio-molecular electronic architectures that can be effectively utilized for sensing and processing of bio-signature data. The novelty of this approach lies in the strategic use of integrated biological elements to achieve higher-level function and spectral data processing within a nanoscale and molecular-level architecture. An overview of this new bio-molecular architectural concept will be presented along with a report on the initial theoretical studies that are underway for defining the functional bio-molecular components. Hence, this presentation will define a new and novel approach for enhancing the spectral sensing of bio-signatures at THz frequencies.