FIR CENTER SEMINAR

Investigating Collective Vibrational Dynamics in Soft-materials Using THz Spectroscopy

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Organizer: FIR UF

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Terahertz (1 THz = 10^{-1} ps) radiation is emerging as the next frontier in science and technology. This frequency domain spans the range of low-energy excitations in electronic materials, low-frequency vibrational modes of condensed phase media, and vibrational and rotational transitions in soft-materials (like biomolecules or colloidal dispersion), with special reference to water, making this a key spectral range for probing fundamental physical and chemical interactions as well as for practical applications.

The pivotal role of hydration in macromolecular structure and functioning has now become a well-accepted fact. Understanding of the nature of such hydration is not very mundane as it involves several individually complex interactions. The dynamics of such hydration covers a range of timescales ranging from hundreds of ns to tens of fs. Several experimental techniques have been exploited to understand hydration of biomolecules, all of them having their corresponding pros and cons. In last few decades Far-infrared (FIR) and THz spectroscopy have emerged with the unprecedented advantage of having low radiation energy and ability to probe the otherwise undetectable collective mode of intermolecular vibration of water molecules. This technique has widely been employed in the recent past in order to understating the hydration dynamics around soft-materials (micelles, vesicles, biomolecules etc.), the change in hydration during various bio-physical processes (e.g., self-aggregation, phase transition etc.). In this talk I will summarize some key concept of this techniques in understanding the hydration dynamics in such soft-materials.