CARRIER DYNAMICS IN $CsPbBr_3$ NANOCRYSTALS IN PRESENCE OF ELECTRON AND HOLE ACCEPTORS: A TIME RESOLVED TERAHERTZ SPECTROSCOPY STUDY.

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Study of lead halide perovskites is a burgeoning field of research owing to their applications in solar cells and myriads of other light harvesting and emitting devices. In this work we have employed Terahertz time domain spectroscopy (THz-TDS) and time-resolved THz spectroscopy (TRTS) to study dielectric properties and carrier dynamics occurring within $CsPbBr_3$ perovskite nanocrystals (NCs) in presence of electron and hole acceptor molecules. The THz-TDS spectrum of $CsPbBr_3$ NCs features a strong and broad band with a peak around 3.4 THz which originates from multiple IR-active optical phonon modes of the nature of Pb-Br stretching and Br-Pb-Br bending vibrations. We observed very efficient electron and/or hole transfer in presence of either an electron or a hole acceptor, or both. Also, in presence of either an electron or hole acceptor the diffusion length reduces to half (4.1 μm) in comparison to parent NCs (9.2 μm). In presence of both, electron and hole acceptor molecules the diffusion length reduces to 0.6 μm. Considerable decrease in mobility values is also observed for the NCs in presence of electron and hole acceptor molecules. Details of the study will be discussed in the talk.