TERAHERTZ TIME-DOMAIN SPECTROSCOPY: PRINCIPLES AND RECENT DEVELOPMENTS

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Terahertz time-domain spectroscopy (THz-TDS) was proposed about 30 years ago by D. Auston as an amazing technique for characterizing materials and samples in the far infrared regime of the electromagnetic spectrum. As compared to the popular Fourier-transform spectroscopy, which was the single technique used before, THz-TDS operates at room temperature and the records are very fast. Moreover, it allows one to perform time-resolved measurements, but its frequency resolution is poorer. This tutorial will present the principles and performances of THz-TDS as well as an overview of recent technologies, systems and applications. THz-TDS in transmission, reflection or attenuated total reflection will be compared. We will also address the characterization of absorbing materials, scattering materials, anisotropic and chiral materials.