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Title: Cross-polarization Response of a Two-contact Photoconductive Terahertz Detector. Authors: Yandong Gong, Hui Dong and Zhining Chen.
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Abstract: The cross-polarization response of a two-contact photoconductive terahertz (THz) detector, is experimentally found in the polarization state measurement of THz radiation in THz time-domain spectroscopy (THz-TDS). It means that this detector responded to a mixture of the two polarization components of THz radiation and such a response is frequency dependent. To evaluate this response quantitatively, three parameters are presented and measured. In the measurement of THz-TDS, such a detector response will result in the distortion of the measured THz spectrum. As a consequence, it will reduce the dynamic range of the system in some frequency bands. In some special cases, it may even lead to a fake “absorption peak” in the THz spectrum. Furthermore, when such a detector is used to measure the polarization state of THz radiation with the assistance of THz polarizers, it will be impossible to decide the optimum orientations of the polarizers as its cross-polarized response is frequency dependent. Finally, we experimentally demonstrated that this effect could be partially eliminated by adjusting the focusing condition of the probe laser beam on the antenna.
Keywords: Terahertz time-domain spectroscopy, Photoconductivity, Polarization