

Terahertz Imaging Progress at Capital Normal University

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The terahertz imaging at Capital Normal University in Beijing is presented. Our works on Terahertz Imaging include the active and passive imaging. For the active terahertz imaging, the pulse and continue wave terahertz imaging are studied respectively. The active terahertz pulse imaging is based on the terahertz time-domain spectroscopy with the probe-beam-expanded femtosecond pulse laser and an infrared CCD detection. The active terahertz continuous wave imaging is based on a CO₂-laser-pumped terahertz coherent source and a NEC terahertz camera. For the passive terahertz imaging, the low frequency of terahertz radiometers are used to detect the beam-scanned terahertz signal by the point-to-point method. The related components and methods are developed and used for the improvement of the imaging speed and the resolution of images.

The polarization terahertz imaging is studied based on the active continuous wave imaging technology. The higher resolution of terahertz imaging is achieved at 3.1 THz of operating frequency. The polarization imaging provide more information on the measured targets. However, the imaging distance of the high frequency, such as 3.1 THz, of terahertz imaging is limited due to the vapor absorption. The focal plane terahertz imaging is developed to obtain more frequency domain of spectral information. The focal plane imaging can be realized as a quasi-near field imaging so that it can achieve at a higher resolution. But the visual field of focal plane imaging is limited due to the size of electro-optic crystal. The passive terahertz imaging is developed for the longer imaging distance and the larger imaging visual field. The sensitivity of terahertz radiometer is a key factor for the contract and resolution of passive terahertz imaging.

In summary, the active and passive terahertz imaging are investigated at Capital Normal University. The advantage and disadvantage of different terahertz imaging technology can be seen and compared. Of course, they depend on the different requirements of application, too. Some further investigations of terahertz imaging are necessary.

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