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THz surface Emission spectroscopy and applications

Yuan Yuan Huang, Lipeng Zhu, Xinlong Xu*

Shaanxi Joint Laboratory of Graphene, State Key Laboratory for Incubation Base of Photoelectric Technology and Functional Materials, and Institute of Photonics & Photon-Technology, Northwest University, Xi'an, China

Corresponding Author. Email: xlxuphy@nwu.edu.cn

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Abstract

Terahertz (THz) wave, bridging electronics and photonics in the electromagnetic spectrum, features many exotic properties and promising applications. However, because of low THz emission efficiency, less sensitive detectors, and few manipulating devices, THz wave is still on the horizon for practical applications since 1980s. With the application of femtosecond laser, THz surface emission spectroscopy has also been developed to serve as a sensitive and contactless tool for the optoelectronic measurement of semiconductor surfaces and interfaces. When a femtosecond laser beam impinges on the semiconductor surface, photocarriers or photodipoles are excited, which then induce THz radiation with the mechanism of photoconductivity or optical rectification. As the THz surface emission is sensitive to the surfaces and interfaces, the modification of the semiconductor surface provides a significant strategy for the design and performance evaluation of many electronic and optoelectronic devices for THz applications. In this talk, we will discuss the THz radiation mechanism for traditional semiconductors by changing the crystal orientation, exciting laser intensity, surface condition, and so on [1-4]. We will also discuss THz radiation from two-dimensional layered semiconductors under linearly polarized femtosecond laser excitation.

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