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Title of the Presentation: Fast terahertz detection in asymmetric dual-grating-gate graphene-channel FETs

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Short Biography:

Daichi Ogiura is a 2nd year master student in the Graduate School of Engineering, Tohoku University. He received B.S. degree from the Tohoku University in March 2019. He is currently working at the plasmon instability on graphene for terahertz device applications.

Abstract:

Plasmonic terahertz (THz) devices based on two-dimensional (2D) plasmons in transistor channels have been researched as promising candidates of on-chip, room-temperature operating, high-speed THz devices [1]. Plasmonic graphene-based field effect transistors (GFETs) have become a promising way for the development of an efficient detector of THz radiation. In this paper, we report on detection of terahertz radiation by using our original asymmetric dual-grating gates graphene-based FET (ADGG-GFET) structure.

We designed and fabricated an ADGG-GFET (Fig. 1). The gate length is 500 nm (G1) and 800 nm (G2), and the distance of gate electrodes is 500 nm and 800 nm. ADGG -GFET has the grating gate, and it acts as a broadband coupler of incoming THz waves with 2D plasmon. Then, we measured output photovoltages from the drain electrodes of the fabricated ADGG-GFET using a digital storage oscilloscope upon pulsed CW-THz wave irradiation (centered at 0.95 THz) generated by an injection-seeded THz wave parametric generator [2]. Figure 2 shows temporal response waveform from the drain electrode, demonstrating a strong photovoltaic response. In conclusion, the ADGG-GFET successfully works as a fast, sensitive THz detector.

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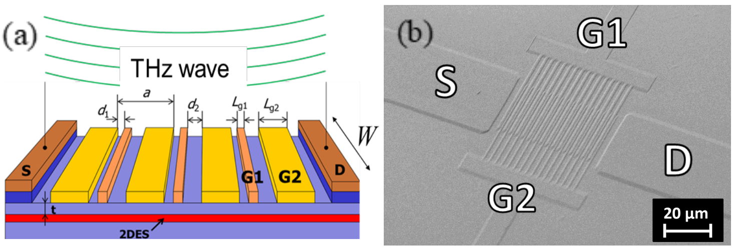

Fig. 1. (a)Schematic view of the ADGG-GFET and (b) an SEM image of a fabricated device.

[1] T. Otsuji and M. Shur, IEEE Microwave Magazine 15, 43 (2014).
[2] S. Hayashi et al., Sci. Rep. 4, 5045 (2014).

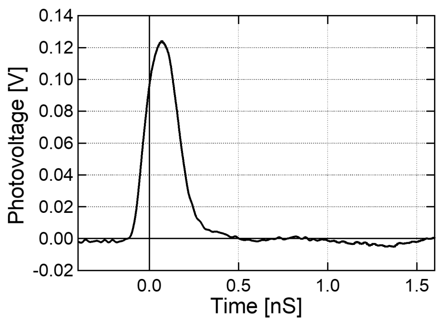

Fig. 2. Temporal response waveform of output photovoltage