東北大学

通研講演会

第 59 回ナノ・スピン工学研究会

ーテラヘルツ波帯グラフェンデバイスー

日時： 2012 年 7 月 24 日(火) 10:30ー12:00、7 月 31 日(火) 10:30ー12:00、8 月 2 日(火) 13:00ー14:30

場所： 東北大学　電気通信研究所　ナノ・スピン研究棟　４階　A401 室

〒980-8577　仙台市青葉区片平２－１－１

言語： 英語

プログラム：

7/24 10:30 - 12:00 part I
7/31 10:30 - 12:00 part II

"Terahertz response of graphene: physics and prospective devices" (in English)

Prof. Dr. Fedir VASKO **Dept. Electrical Eng., University at Buffalo, USA**
(Visiting Prof. at RIEC, Tohoku Univ.)

The study of graphene is a research topic that has expanded rapidly over the past five years. The motivation for the popularity of this field largely stems from the unique optoeletronic, mechanical, and chemical properties of graphene as well as from the prospects for device applications. Here, both the basic properties of a single-layer graphene are outlined and recent advances in the development of the THz graphene-based devices are reviewed. The following points will be addressed: peculiarities of graphene, relaxation/recombination processes, interaction with radiation, photocurrent, optical modulation, response to strong field, current results for THz/mid-IR spectral region, and possible applications.

8/2 13:00 - 14:30

"THz detectors based on heating of two-dimensional electron gas in disordered nitride heterostructures" (in English)

Distinguished Prof. Dr. Vladimir MITIN **Dept. Electrical Eng., University at Buffalo, USA**
(Visiting Prof. at RIEC, Tohoku Univ.)

We investigate possibilities of disordered GaN heterostructures for direct and heterodyne detection and for THz spectroscopy above 1 THz. The lecture will discuss design, fabrication, and characterization of room-temperature hot-electron THz micro- and nanobolometers with ultra-low electron heat. Several methods for 2DEG nanoscale patterning, including the split-gate design, are studied to fabricate sensors with ultrasmall electron heat capacity. We have experimentally demonstrated strong coupling of 2DEG to THz radiation due to the Drude absorption. We reach 10-100 Ω detector impedances, which allow us to combine our sensors with available THz antennas. Because of the ultra-low electron heat capacity of the sensor, the THz receiver will require the local oscillator power at the level of 1-10 μW.

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