

July 25, 2014.

**72nd Nano-Spin Engineering Meeting
RIEC Special Lecture**

- Terahertz plasmonic devices and their imaging applications -

Dear Sir,

I am pleased to announce that the 72th Nano-Spin Engineering Research Meetings and RIEC Special Lecture will be held as follows.

Please join us.

Yours truly,
Taiichi Otsuji
RIEC, Tohoku University

Date: July 30, 2014 (Wed) 15:00 to 17:00
Venue: Room A401, 4th floor, Nano-Spin Building,
RIEC: Research Institute of Electrical Communication,
Tohoku University
2-1-1 Katahira, Aoba-ku, Sendai, 9808577, Japan
Registration: On site
Language: English
Lecturer: Prof Dr Yahya M. MEZIANI
Dept. Of Applied Physics & Electronics, University at Salamanca, Spain

Program:

15:00 – 16:00 "Plasma wave transistor for terahertz imaging"

We report on non-resonant (broadband) and resonant detection of terahertz radiation using strained-Si modulation doped field effect transistors. The devices were excited at room temperature by two types of terahertz sources (an electronic source based on frequency multipliers at 0.292 THz and a pulsed parametric laser at 1.5 THz). In both cases, a non-resonant response with maxima around the threshold voltage was observed. Shubnikov-de Haas and photoresponse measurements were performed simultaneously and showed a phase-shift of $\pi/2$ in good agreement with the theory, which demonstrates that the observed response is related to the plasma waves oscillation in the channel. The non-resonant features were used to demonstrate the capabilities of such devices in terahertz imaging. We also cooled our device down to 4.2 K to increase the quality factor and resonant detection was observed by using a tunable source of terahertz radiation.

16:10 – 17:00 "Terahertz time domain spectroscopy"

The terahertz time-domain spectroscopy (THz-TDS) is based on a Ti: Sapphire femtosecond laser and two low-temperature grown GaAs photoconductive antennas for emission and detection of THz radiation. A working window from 0.2 to 2.5 THz was obtained. The THz-TDS is a powerful tool to characterise the free carrier response of graphene and probe the inter- and intra-band response of excited carriers with sub-ps time resolution. First, spectral response of water vapour absorption is reported and compared to HITRAN database. A good agreement was observed. Finally, the THz spectra of different graphene layers have been measured showing higher transmission at terahertz frequencies for mono layer graphene.

Contact to:
Prof. Otsuji Taiichi
Ultra-Broadband Signal Processing
Broadband Engineering Division
Research Institute of Electrical Communication
Tohoku University
Email: otsuji@riec.tohoku.ac.jp