

**Commission D (Electronics and Photonics) Activity Report**

November 2012-February 2013

March 5, 2013

Tadao Nagatsuma

**1. Commission Activities****• Proposal of Sessions for AP-RASC 2013**

DJ2: Terahertz-wave Technologies

Ci-Ling Pan, Tadao Nagatsuma

DC: Radio-over-fiber systems and technologies

Hai-Han Lu, Toshiaki Kuri

**• Proposal of Sessions for URSI-GASS 2014**

Broadband Ubiquitous Network with Wired and Wireless convergence

Katsumi Iwatsuki, Yuichi Kado, Katsutoshi Tsukamoto

Session Topic: The bandwidth of next generation access networks will strongly require that of current optical access, due to the download of huge data, images, and videos, as well as to upload of a large number of sensor data, at anytime and anywhere. The technical convergence with wired and wireless plays an important role to achieve the broadband ubiquitous networks beyond the current access networks. The technologies innovated with technical convergence have an impact on core network architecture, as well. In this session, we will discuss optical/electronics device and system for recently emerging wired and wireless technologies for access and core networks including sensor networks.

Trends in THz Communications

Tadao Nagatsuma, Ci-Ling Pan, Thomas Kuerner

Session Topic: Recently, there has been an increasing interest in the application of terahertz waves to broadband wireless communications. In particular, the use of frequencies above 275 GHz is one of the strong concerns among radio scientists and engineers, because these frequency bands have not yet allocated at specific active services, and there is a possibility to employ extremely large bandwidths for ultra-broadband wireless communications. This session will focus on recent advances in ultrahigh-speed wireless communications technologies using carrier frequencies from 100 GHz to 1 THz. Enabling technologies such as signal generators, modulators, detectors, amplifiers, antennas, and filters, system demonstrations, applications, wave propagation/interference, and standardization issues will be discussed.

**2. Domestic activities related to areas covered by Commission D*****Technical Committee on Microwave Photonics (IEICE):***

Following technical meetings were held on specific subjects including regular contributions:

November 8, 2012 (Kyoto); ultrafast photo-detectors and optical/electrical conversion devices  
January 24-25, 2013 (Osaka); Optical access systems for mobile communications, etc.

***Technical Committee on Terahertz Applications Systems (IEICE):***

Following technical meetings were held on specific subjects including regular contributions:  
December 17-18, 2012 (Sendai); Progress in millimeter-wave and THz devices/systems  
January 17, 2013 (Tokyo); Trends in terahertz technologies, ALMA projects, THz measurements, etc.

**3. International activities related to areas covered by Commission D**

***International Symposium on Frontiers in Terahertz Technologies (FTT2012):***

The conference was held from 27-29 November 2012 consisting of 3 days technical sessions in Nara, Japan. Almost all oral papers are plenary and invited ones covering topics on sources, detectors, and applications for measurement, imaging, spectroscopy, and communications; number of oral papers is about 40, while poster papers are about 110, and there were about 250 registrations.

***Workshop on “Towards THz Communications Systems and Applications” at IEEE Radio Wireless Week (RWW) 2013:***

This workshop was intended to introduce some of these new THz device and circuit concepts as they apply to ultra-high speed communications and wireless transmission. Notable THz experts from Asia, Europe and the US presented their latest results and their thoughts on where the field is headed. This is the first workshop specifically on THz communications at this premier microwave-related international conference held on 20 January, 2013 in Austin.

***Terahertz: New opportunities for Industry***

The lecture-style workshop was held in EPFL (Lausanne) from the 11-13 February 2013, which covers fundamental techniques for THz signal generation detection and transmission such as THz sources based on Solid State, Gyrotron, Extended Interaction Klystron (EIK), Quantum Cascade Laser, THz transmission media (QCL), etc. as well as possible industrial applications such as inspection & security, non-destructive testing & evaluation, communication, medical & analysis, pharmaceutical.