SICE2014 講演会オーガナイズドセッション報告

温度計測部会では、2014 年 9 月 9 日～12 日に北海道大学で開催された SICE Annual Conference 2014 において、“Recent Advances in Temperature Measurement”をテーマとしたセッションを企画しました。セッションでは計 6 件の口頭発表が行われ、活発な質疑応答と議論がありました。ご発表頂いた講演者とセッションに参加頂いた方に感謝致します。
講演の題目並びに概要は下記の通りです。SICE2014 については http://www.sice.or.jp/sice2014/をご覧ください。
講演詳細については、SICE 発行の論文集（DVD）をご参照下さい

1. **Evaluation of Automatic Direct Current Comparator Bridge for Temperature Measurement**
   Koyama Jun, Kodama Takeomi and Hamada Tokio : Tanaka Kikinzoku Kogyo K.K.
   Abstract: A manual type direct current comparator bridge (DCCB) has been used in order to realize the International Temperature Scale of 1990(ITS-90) with platinum resistance thermometers and temperature fixed points. However, another automatic type DCCB have been utilized in recent years, especially in electrical standard measurement field. So that an automatic type direct current comparator bridge was evaluated in order to apply temperature measurement with not only standard resistors but also platinum resistance thermometers. As the results, the new type automatic bridge shows similar or better properties with those of the old type manual one. It will be possible to apply the automatic bridge to temperature measurements with similar or better uncertainty.

2. **Evaluation of Thermal Radiation from Pd Containing Ceramics**
   Aizawa Hiroaki, Takano Shinya, Katsumata Tooru and Shuji Komuro : Toyo Univ.
   Abstract: We proposed a novel optical hydrogen gas sensor based on exothermic reaction of hydrogen storage alloy. The thermal radiation of a hydrogen storage alloy has been studied for a hydrogen gas sensor application. The experimental results using palladium (Pd) pellet as a hydrogen storage alloy was presented in SICE 2013. The heat of reaction from the Pd pellet under hydrogen gas was successfully measured using IR thermometer. However, surface temperature of the Pd pellet cannot measured accurately due to a poor emissivity of the Pd pellet. In order to improve the optical hydrogen gas sensor, the Pd containing ceramics were prepared as a sensor material and the emissivity of the Pd containing ce-ramics were estimated using IR thermometer.

3. **Temperature Measurements of Ethylene-Air Premixed Flame under Microwave Irradiation Using a Near-Infrared Diode Laser**
   Fujisawa Yoshiki, Tanaka Kotaro and Konno Mitsuru : Ibaraki Univ.
   Abstract: The temperature of an ethylene (C2H4)-air premixed flame under microwave irradiation was measured using diode laser absorption spectroscopy. A C2H4-air premixed flame with an equivalence ratio of 0.9 was irradiated with 2.45 GHz single-mode microwaves at powers of 0 and 50 W. Because water (H2O) is one of the main hydrocarbon combustion products, the temperature of the flame was determined from the absorbance ratio of two H2O absorption lines in the 1.4 μm region. The optimal 10 pairs

of H2O absorption lines for the temperature measurements were selected by a systematic analysis of a H2O spectrum simulation using HITRAN in the 1399?1479 nm region. Among them, the most appropriate line pair, which is at 7053.939 cm−1 and 7054.233 cm−1, was used for the temperature measurements. We found that the temperature increased when the flame was irradiated with microwaves. This method allows us to measure the temperature of a flame irradiated with microwaves.

4. **Development of the Acoustic Gas Thermometry at NMIJ, AIST? System Construction**
   Misawa Tetsuro, Widiatmo Januarius Vincentius, Kano Yuya and Yamazawa Kazuaki : NMIJ/AIST
   Abstract: Continuing to the previous preliminary tests on acoustic and microwave measurement systems, progress on the construc−tion of acoustic gas thermometer at NMIJ, AIST, including the microwave measurement system, acoustic measurement system and gas handling system is reported. The acoustic and microwave measurements based on the thermometer un−der argon gas atmosphere have been conducted, the results of which have been used to estimate the Boltzmann con−stant by incorporating the literature of the several physical properties of argon and copper.

5. **Dual−Wavelength Reflectance−Ratio Method for Emissivity−Free Radiation Thermometry**
   Yamada Yoshiro and Ishii Juntaro : NMIJ/AIST
   Abstract: Reflectance−ratio technique for emissivity−free radiation thermometry is extended to dual−wavelength detection. Compared to dual−polarization reflectance−ratio method that was successfully applied to measurement of silicon wafers during annealing, the current approach is expected to be less sensitive to surface roughness and thus have wider range of applications including steel production lines. Measurement principle, measurement setup and preliminary measurement results are presented.

6. **Improvement of Blackbody Radiator with Carbon Nanotube**
   Shimizu Yukiko, Ishii Juntaro and Yamada Yoshiro : NMIJ/AIST
   Abstract: A target disk coated with vertically aligned carbon nanotubes (CNT) is applied to a cavity−type blackbody thermal radiator as a part of cavity wall. Effective emissivity of this cavity is greatly enhanced and becomes close to 1. Its wavelength dependence is also much reduced. Observed and calculated changes in radiance temperature of the cavity due to the CNT disk show good agreement with each other. The dependence of the radiance temperature on the cavity depth is reduced with CNT substantially, thus enabling a compact cavity which can be effectively employed in the precise calibration of industrial radiation thermometer working in a wide wavelength range.