

第 31 回センシングフォーラム・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 25 日～26 日に佐賀大学で開催された第 31 回センシングフォーラムにおいて、“温度計測最前線”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 5 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。第 31 回センシングフォーラムについては http://fiber.shinshu-u.ac.jp/sice/sf31/SF31_program.pdf 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. 白金抵抗温度計用自動直流電流比較ブリッジの評価

○小山純・児玉武臣・浜田登喜夫(田中貴金属工業)

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. So that an automatic type direct current comparator bridge was evaluated in order to apply temperature measurement with 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 better uncertainty.

2. SOFC 可視化による電極面の温度分布測定

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Abstract: Solid Oxide Fuel Cell(SOFC) is a kind of fuel cell, and it has highest energy efficiency of all types of fuel cells. Recently, SOFC has significant application for domestic use. For longer operating life and high efficiency, it is important to understand mechanism of physical deterioration and damage on SOFC electrode surface. However, In the case of well-known SOFC testing method, the surface of cell is invisible while generating electricity. Therefore, we have developed the new SOFC testing holder with sapphire windows and thermography. By implementing this method, we have found that temperature distribution on surface of anode electrode is changed in the process of electricity generation and suffering physical damage.

3. 1950°C付近におけるイリジウム-ロジウム熱電対の評価技術

産業技術総合研究所 小倉 秀樹、井土 正也、○山澤 一彰

Abstract: A feasibility study for the iridium-40% rhodium versus iridium (IrRh-Ir) thermocouples was conducted around 1950 ° C using the high temperature furnace. After exposure tests, emfs of IrRh-Ir thermocouples were measured at ruthenium-carbon (Ru-C) eutectic point (1953 ° C). It was found that the iridium sheaths of thermocouples were effective to avoid the breakage of thermocouples at high temperature. The emf values of three thermocouples at Ru-C eutectic point indicated an agreement within ± 7 ° C in spite of different fabrication conditions.

4. 2色放射温度計の標準化に向けた原案作成と評価技術の開発

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Abstract: Two-color ratio thermometer is used to measure temperature of material surfaces with unknown or varying emissivities in research and industry. It is also used for the temperature measurement through window with changing transmittance in manufacturing processes and for temperature measurement of small objects or thin wire rods. However, there is no technical document for the evaluation of its character and for calibration method with uncertainty estimation. To prepare a technical document for standardization of two-color ratio thermometer, discussions and investigations on technical issues intrinsic to two-color ratio thermometer have been conducted under a working group (WG) of Japan Society for the Promotion of Science (JSPS). This paper describes the proposed definitions of technical terms along with their test methods, which are unique to two-color ratio thermometer.

5. 精密海洋温度センサの校正のための比較水槽の評価

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Abstract: Deep ocean temperature measurements is one of the key parameters for geoscience. It requires high precision measurements; for example, a temperature difference as small as 5 mK(0.005 °C) for deep ocean water plays a very important role as a possible index for the evaluation of global warming. To underpin the reliability of the data, and to ensure that the collected data are comparable over years, sensors used in the measurements should be precisely calibrated.

In our previous paper, we evaluated the calibration uncertainty of a deep water sensor for fixed point calibration and for calibration through comparison measurements. In this paper, we present a more detailed evaluation result of the comparison water bath targeted for the calibration of the deep ocean temperature sensor, along with the calibration uncertainties. We demonstrate that the hysteresis characteristics of the SBE35 as small as 0.3 mK is detectable employing our comparison bath.