CCT Member Activity Report (KRISS)

Period: May 2024 to May 2026

Institute: Korea Research Institute of Standards and Science (KRISS)

Number of Staff in Thermometry: 12 (Contact thermometry 4, Non-contact thermometry 2, Humidity 3, Thermophysical quantities 3)

Research activities

- **Fixed point for contact thermometry**: Compared the triple point of water cells at KRISS, providing reference data to ensure consistency and reliability of temperature standards. (https://doi.org/10.1063/5.0234565)
- **Fixed point for non-contact thermometry**: Measured the melting and freezing temperatures of iron (Fe) using radiation thermometry, providing high-accuracy data for updating Secondary Reference Fixed Points under CCT-WG-CTh. (https://doi.org/10.1088/1681-7575/adb492)
- **Primary thermometry:** Measured thermodynamic temperature from 185 K to 303 K using acoustic gas thermometry. KRISS submitted a capsule SPRT carrying KRISS thermodynamic temperature calibration to the EURAMET Direk-T project (2023–2026) as an Official Collaborator. KRISS will continue participation in the planned Setup-T project (2026–2029) as an External Partner.
- **Thermometry for meteorology**: Examined the effect of a cylindrical subchamber on thermometer calibration uncertainty in climate chambers, providing data to improve calibration accuracy (https://doi.org/10.1007/s10765-026-03751-5)
- **Thermometry for meteorology**: Evaluated calibration uncertainty and response time of RS41 humidity sensors under a ventilation speed of 5 $m\,s^{-1}$, providing reference data for accurate atmospheric measurements (https://doi.org/10.1002/met.70097)
- **Thermometry for meteorology**: Measured relative humidity of a thin-film humidity sensor under condensing conditions from −40 °C to 5 °C, providing data for accurate low-temperature humidity measurements (https://doi.org/10.1088/1361-6501/ad3c62)
- **Humidity**: Compared frost point measurements using alternating air, nitrogen, and methane in a saturator to determine a water vapor enhancement factor ratio and its uncertainty. (https://doi.org/10.1088/1681-7575/adf444)
- **Thermophysical quantities**: Developed a measurement system for determining the specific heat of refrigerants, providing measurement capability for thermophysical property characterization. (https://doi.org/10.32908/hthp.v54.1859)
- **Thermophysical quantities**: Evaluated the in-plane thermal diffusivity of graphite sheets using the laser flash method, providing data for thermal property characterization. (https://doi.org/10.32908/hthp.v54.1873)
- **Thermophysical quantities**: Calibrated the temperature scale and enthalpy of fusion measurements of a Calvet calorimeter over the range from −150 °C to 156 °C, improving the accuracy and traceability of calorimetric measurements. (https://doi.org/10.1504/IJNT.2024.137420)
- Submitted and presented two posters to the **BIPM** at the **150th anniversary of the Metre Convention** in the field of thermometry and thermometry for meteorology (March 2025)

CMC registered at KCDB

- KRISS currently has 75 valid thermometry-related CMCs at the BIPM KCDB
  - 63 in contact thermometry; 7 in non-contact thermometry; 5 in humidity
- Since 2024, five CMCs have been newly registered or improved, including low-temperature extensions and reduced uncertainties in IPRT and digital thermometer calibrations.

RMO activities

- Participated APMP TCT meeting (1 in person, 1 online), New Delhi, India, Nov. 2024
- Participated APMP TCT meeting (6 in person), Incheon, Korea (Hosted), Nov. 2025
- Participated in WGs in APMP TCT, with the main task being the review of intra-RMO and inter-RMO CMCs, including one leadership role in a WG (WG on SPRT and Fixed-point).

Peer Review activity to support CIPM MRA

- Dr. Sang-Wook Lee for CMS/ITRI, Humidity, 2025
- Dr. Inseok Yang for NMIM, Contact thermometry, 2026 (scheduled for September)

Conferences attended

- TEMPMEKO ISHM Symposium 2025 (Reims, France)
  - No. of attendees from KRISS: 12
  - Papers presented: 11
  - 2 staff in the International Program Committee

Key and supplementary comparisons (on-going and recently completed)

- Comparisons piloted by KRISS
  - APMP.T-K4.2, Pilot, Realization of the aluminum freezing-point temperature, Approved for equivalence in 2026, https://doi.org/10.59161/ZHMZ7323
  - APMP.T-K7.2021, Pilot, Comparison of Water Triple Point Cells, Draft A report under circulation
  - APMP.T-S10, Pilot, Thermal conductivity, Measurements completed, Draft A in preparation
  - APMP.T-S17, Pilot, Air Thermometers, Draft B under review
- Comparisons KRISS is participating
  - CCT-K8, participation (pilot: INTA), dew point (30 to 95), Approved for equivalence in 2025, https://DOI.org/10.1088/0026-1394/62/1A/03001
  - APMP.T-K6.2013, participation (pilot: NMC A*STAR), Frost point and dew point (-50 °C to

20 °C), Draft B under review

- APMP.T-K9, Co-pilot (Pilot: NIM), SPRT calibration at Ar – Zn, Draft A in circulation
- APMP.T-S9, participation (pilot: NMIN), thermal diffusivity, Draft A under preparation
- APMP.T-S13, participation (pilot: NMC A*STAR), Frost point (-60 °C, -70 °C, -80 °C, -90 °C), Draft B under review
- APMP.T-S14, participation (pilt: MSL), relative humidity (10 % to 95 %), Draft A under preparation
- APMP.T-S16, participation (pilot: NMIA), Type R thermocouple at Cu, Co-C, Pd fixed points, participation, Approved for equivalence in 2025, https://doi.org/10.1088/0026-1394/62/1A/03003