

# CCT Guides update

Jonathan Pearce

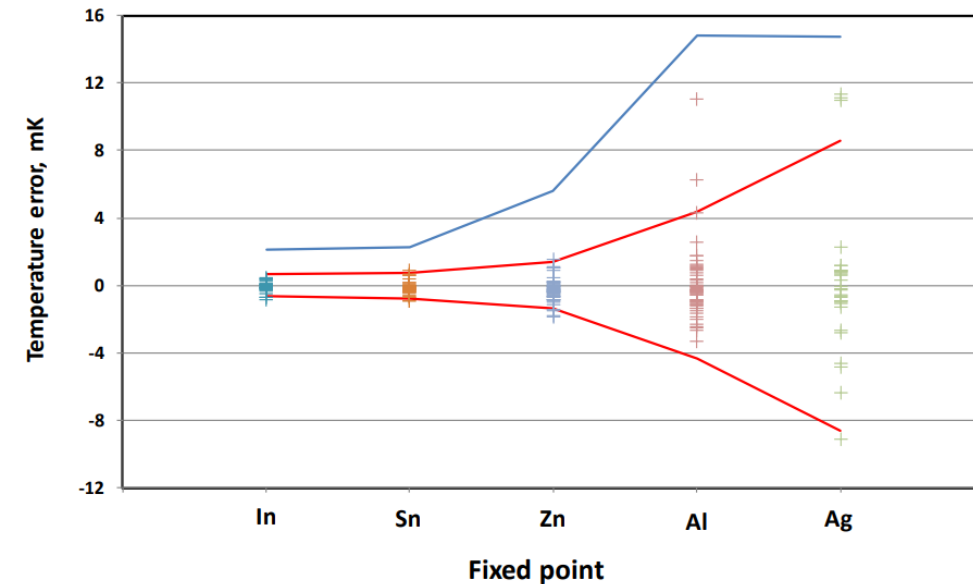
30<sup>th</sup> meeting of the CCT, 18 January 2022

# Guides in progress (since last CCT meeting)

- Thermocouples I: General Usage – Rod White et al. published online 2021
- Industrial Platinum Resistance Thermometry – Jonathan Pearce et al. published online 2021
- Metal Fixed Points for Contact Thermometry – Christof Gaiser updated Appendix 1 to reflect new guidance on pressure effect in SMFPCs
- Specialised fixed points above 0 °C – Jovan Bojkovski to update to reflect new Appendix 1 of Metal Fixed Points for Contact Thermometry guide
- Thermocouples II: Calibration and reference thermocouples – Rod White and Frank Edler updating
- Industrial radiation thermometry – in progress, Mohamed Sadli coordinating
- Thermistor thermometry – Rod White updating
- Calibration media – in progress, **lead author to be identified**
- Guide for fixed points below 0 °C – not started, **lead author to be identified**

# Sealed metal fixed point cells

- Guidance for the uncertainty arising from unknown pressure in sealed metal fixed point cells (SMFPCs)
- Affects Appendix 1 of the Metal Fixed Points for Contact Thermometry guide, and Specialised Fixed Points Above 0 °C guide
- Guidance was originally based on CCT/17-20 which surveyed a large number of calibrations of SMFPCs
- Three issues which gave unrealistic estimates of the uncertainties of the pressure effect of fixed point realisations with SMFPCs
  - Large percentage of Al and Ag cells in the survey with temperature outside two standard deviations, with non-normal distribution
  - Uncertainties given in CCT/17-20 are for four top NMIs, so represent typical dispersion when cells are in good thermal environments, good equipment, procedures, etc.
  - For most labs uncertainties will be larger, so the full suite of tests required for an open cell must be carried out to determine realistic uncertainties for any given situation



# Sealed metal fixed point cells

- Jonathan Pearce, Richard Rusby, Christof Gaiser, Bernd Fellmuth, Jovan Bojkovski, Andrea Peruzzi revised guidance
- New table of uncertainties for the pressure contribution based on a triangular distribution having width given by the extreme values given by CCT/17-20
- It must be emphasised that this is the recommended uncertainty contribution **due to the pressure effect only** in the absence of verification against an open cell operated at a known pressure and checked for drifts
- Ultimately it is recommended that SMFPCs are calibrated against an open cell
- Appendix 1 of the Metal Fixed Points for Contact Thermometry guide updated
- Jovan Bojkovski will update Section 4.1 of the Specialized Fixed Points Above 0 °C guide with Table 3

**Table 3:** Recommended values for the standard uncertainties of uncertified sealed cells, due to the unknown pressure.

Fixed point	In	Sn	Zn	Al	Ag
Fixed-point temperature (K)	429.7485	505.078	692.677	933.473	1234.93
Recommended standard uncertainty due to the unknown pressure ( $k = 1$ ) (mK)	0.7	0.7	1.7	4.5	4.5

Old values:                      0.33      0.38      0.69      2.17      4.3



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