Realization of the Triple Point of Hg and Observation of a Large Super-Cooling Temperature

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Temperature of the triple point of Hg is 234.3156 K, which is defined by the International Temperature Scale of 1990 (ITS-90) as one of the temperature fixed points. It is used for calibration of standard platinum resistance thermometers to make ITS-90 in low temperature. We developed an adiabatic calorimeter to calibrate capsule type standard resistance thermometers at the triple point of Hg. A pulse-tube refrigerator is adopted as a cooling system, and a small-glass cell (diameter: 10 mm, length: 40 mm) with about 77 mmol of Hg (nominal purity 99.9999 %) is mounted horizontally in an aluminum block to reduce hydrostatic temperature difference in Hg at the triple point. As an example, the standard uncertainty in calibrating a capsule type platinum resistance thermometer is estimated to be 0.07 mK. We also observed a large super-cooling temperature during freezing of Hg to realize the triple point by using the small-glass cell. The super-cooling temperature is over 15 K, which is much higher than measured by using a large cell. In this talk, we will report those results in detail.