

Standards and Measurement Technology

Novel Ultra-High Temperature Standards above 2000°C

Temperature fixed points are widely used in defining, realizing, maintaining, and disseminating temperature scale. To extend the fixed-point temperature range above the current practical limit of copper point (1085 °C), a novel series of high-temperature fixed points have been developed at the AIST, which use metal-graphite eutectic instead of pure metal as fixed-point material. Performance evaluations for 9 fixed points in the temperature range 1100 °C to 2500 °C show the fixed points can potentially improve the ultra-high temperature scale by one order of magnitude or more. The potential impact of this technique to related fields is presented.

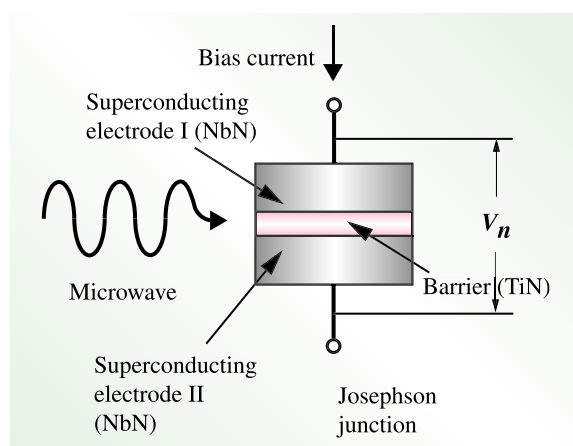


Eutectic point observation by radiation thermometer

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Development of Josephson Junctions for Liquid-Helium Free Voltage Standard System

With the progress of industrial technologies, need for portable Josephson voltage standard system is increasing. However, widespread use of Josephson voltage standard system is prevented by the necessity of liquid helium in the operation of the system. To overcome the problem, we have been developing niobium nitride(NbN)-based Josephson junctions for voltage standard system. NbN is known as a superconductor having a critical temperature over 15K and its high-quality thin films can be prepared by reactive sputtering without using substrate heating. We recently succeeded to develop NbN-based Josephson junctions (NbN/TiN/NbN junction)



NbN-based Josephson junction for voltage standard

which can be operated at 10K. Using this junction, we will construct a liquid-helium-free Josephson voltage standard system within a few years.

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