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SRD1000 with improved reference points for thermometry below 1 K

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Introduction

SRD1000 devices support 10 reference temperatures between 10 mK and 1200 mK for calibrations on the PLTS-2000

Device detects the superconductive transitions of samples of various materials to establish the reference temperatures

Prototype devices were evaluated by several institutes for metrology in Europe[1]

For a new series of devices we developed improved preparation methods of the reference samples

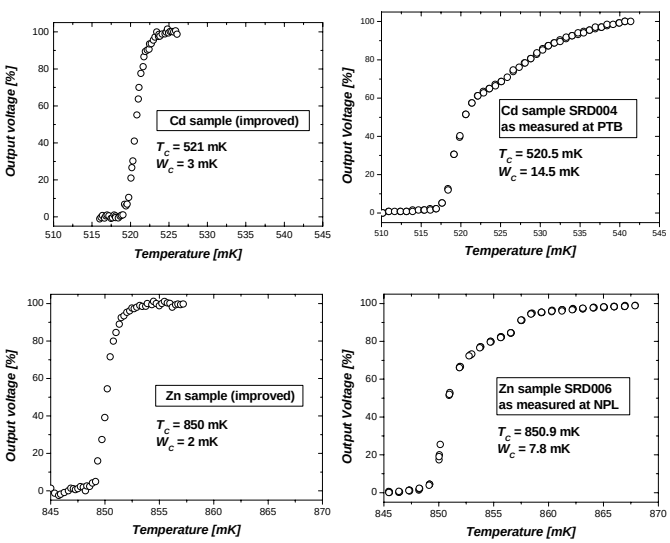
Preparation improved Cd and Zn samples

Samples were spark cut from high purity single crystals

Copper-sulphate etch removes interaction area cutting process

Omitting varnish from attachment process reduces mechanical stress

Comparison improved Cd and Zn with prototype samples



Transition temperatures T_C and widths W_C of SRD1000 prototypes and the new series

reference material	nominal T_C [mK]	W_C prototypes [mK]	W_C new series [mK]
W	15	< 0.2	< 0.2
Be	22	< 0.3	< 0.3
$Ir_{80}Rh_{20}$	30	0.7 - 1.2	0.3 - 1
$Ir_{92}Rh_{08}$	65	0.7 - 1	0.3 - 1
Ir	98	0.3 - 1	0.3 - 1
$AuAl_2$	145	0.4 - 0.7	0.3 - 0.6
$AuIn_2$	208	0.5 - 3	0.5 - 1
Cd	520	12 -15	2 - 4
Zn	850	5 - 16	2 - 3
Al	1180	2 - 4	2 - 4

Conclusion

New preparation methods reduce W_C of Cd and Zn samples by factor of 4

Reduced W_C enables more accurate determination of reference temperatures

Sample improvements will be implemented in a new series of SRD1000 devices

Further information

E-mail: *HDLinfo@xs4all.nl*
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Reference

1. S. Schöttl et al., this symposium