AU9918224

A HIGH T_c SUPERCONDUCTING LIQUID NITROGEN LEVEL SENSOR

J.X. Jin, H.K. Liu and S.X. Dou
Center for Superconducting and Electronic Materials
University of Wollongong, Wollongong, NSW 2522, Australia

C. Grantham and J. Beer
Dept. of Electric Power
University of NSW, Sydney 2052, Australia

The dramatic resistance change in the superconducting-normal transition temperature range enables a high T_C superconductor to be considered for designing a liquid nitrogen level sensor. A $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10+x}$ Ag clad superconducting wire is selected and tested as a continuous liquid nitrogen level sensor to investigate the possibility for this application. The $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10+x}$ Ag clad superconducting wire has approximately 110 K critical temperature, with more flexible and stable properties compared with bulk shape ceramic high T_C superconductors. The voltage drops across the sensor are tested with different immersion lengths in liquid nitrogen. The accuracy of the HTS sensor is analysed with its dR/dT in the superconducting-normal transition range. The voltage signal is sensitive to liquid nitrogen level change, and this signal can be optimized by controlling the transport current. The problems of the Ag clad superconductor are that the Ag sheath thermal conductivity is very high, and the sensor normal resistance is low. These are the main disadvantages for using such a wire as a continuous level sensor. However, a satisfactory accuracy can be achieved by control of the transport current. A different configuration of the wire sensor is also designed to avoid this thermal influence.