Development of NTD Ge Sensors for Superconducting Bolometer

Main author: NANAL Vandana

Co-authors: Dokania Neha, HBNI and INO, TIFR
Garai Abhijit, HBNI and INO, TIFR
Jagadeesan K C, IP&AD, BARC
Mathimalar S, HBNI and INO, TIFR
Nanal Vandana, DNAP, Tata Institute of Fundamental Research
Pillay R G, DNAP, TIFR
Shrivastava Aradhana, NPD, BARC
Singh Vivek, HBNI and INO, TIFR
Thakare S V, IP&AD, BARC

A feasibility study to search for neutrinoless double beta decay (0νββ) in 124Sn has been initiated in India [1]. It is proposed to make a Tin cryogenic bolometer operating at ~10 mK, for measurement of the sum energy of two electrons with high precision. The development of neutron transmutation doped (NTD) Ge sensors for mK thermometry is in progress [2]. The NTD Ge is prepared at Dhurva reactor by irradiating device grade, 1 mm thick <100> Ge with thermal neutrons. The procedure for making Ohmic contact on NTD Ge using Au (88%)-Ge(12%) thermal diffusion technique has been optimized. The dR/dT for different samples have been measured in NI-PXI 6229 DAQ system with a high precision constant current source (range 2 pA - 1 nA), in order to determine optimum neutron dose. Tests with a prototype of natural Sn bolometer (~ 3 g) using the NTD Ge sensor are in progress. This paper reports characterization of NTD Ge sensors.

http://dx.doi.org/10.1109/WOLTE.2014.688
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