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Development of NTD Ge Sensors for Superconducting Bolometer

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A feasibility study to search for neutrinoless double beta decay (0 νββ) 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 (~ 3g) using the NTD Ge sensor are in progress. This paper reports characterization of NTD Ge sensors.

[1] V. Nanal, EPJ Web of Conferences 66 (2014) 08005
[2] S. Mathimalar, et al., IEEE WOLTE Conf. (2014)
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