Abstract

The half-life of two-neutrino double beta decay of $^{150}Nd$ has been measured with data taken by the NEMO-3 experiment at the Modane Underground Laboratory. Using 1918.5 days of data recorded with 36.55 g of $^{150}Nd$ the half-life of this process is measured to be

$$T^{2\nu}_{1/2} = (8.99 \pm 0.18 \text{ (stat.}) \pm 0.71 \text{ (syst.}) \times 10^{18} \text{y.}$$

SuperNEMO is the successor to NEMO-3 and will be one of the next generation of $0\nu\beta\beta$ experiments. It aims to measure $^{82}Se$ with an half-life sensitivity of $10^{26}$ yr corresponding to $\langle m_{\beta\beta} \rangle < 50$ - 100 meV. In order to achieve this target, a testing apparatus for the scintillator characterization has been developed and 140 scintillator blocks were characterized for the calorimeter of the SuperNEMO. It was determined that none of the blocks violate defined criteria of uniformity ($\pm 3\%$ for the energy resolution at 1 MeV) nor the criteria of energy resolution ($< 16\%$ at 1 MeV). The average uniformity of the blocks was found to be 0.7\% and the average energy resolution of these blocks is 12\% at 1 MeV. However, it was discovered during the visual tests that 23 out of 140 blocks contain more than 20 visible dust specks, thus alarming the possible contamination of these blocks with the natural radioactive isotopes.