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The influence of the dead layer increase on total gamma spectrum response for a coaxial HPGe p-type detector

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The dead layer thickness increase of HPGe detectors in during the operation time is main effect for reducing the volume and the full energy peak efficiency FEPE of the HPGe detector. In the work, we studied the influences of dead layer thickness on the whole gamma spectrum response for HPGe detector by using Monte Carlo simulation. From the simulated relation of the FEPEs and the dead layer thicknesses, the dead layer thickness of 0.588 mm was derived which was increase 28% in comparison with the nominal value of 0.46 mm from manufacturer after 4 years of operation. The multiple scattering region and peak ROI decrease with different rates and the valley region of forward scattering photon increases quickly when the dead layer thickness increases. The influence of the volume-to-surface area ratio (V/A) on the peak-to-total ratio (P/T) was evaluated. The trend of P/T vs V/A as a polynomial function of 2nd order and energy dependence of the P/T were found.

Minioral

Yes

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