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Will Lanthanum Halide Scintillators Make NaI(Tl) Obsolete?
BRIAN MILBRATH, Pacific Northwest National Laboratory — The commercial availability of lanthanum halide scintillators ($LaCl_3$:Ce and $LaBr_3$:Ce) has been much anticipated due to their significantly better resolution (3-4% at 662 keV) relative to NaI(Tl). Unfortunately, our initial investigation of these scintillators revealed significant alpha contamination quite apparent in background spectra. Using measurements of the detector in coincidence with a HPGe detector, we identified the alpha-contaminant as Ac-227. Since this time, the alpha contamination has been substantially reduced so that a second contaminant, La-138 (a beta, gamma, and x-ray source) has become the dominant contaminant in the material. Commercially-available sizes of lanthanum halide scintillators have now reached sizes suitable for handheld Radioactive Isotope Identification Devices (RIIDs). To study the potential of this new material for RIIDs we performed a series of measurements comparing a 1.5" x 1.5" $LaBr_3$ detector with an Exploranium GR-135 RIID, which contains a 1.5" x 2.2" NaI(Tl) detector. Measurements were taken for short timeframes of seconds to minutes, as typifies RIID usage. Measurements included examples of naturally occurring radioactive material (NORM) typically found in cargo. Of particular interest was the extent to which interference between the La-138 contaminant and K-40, a radioisotope commonly found in NORM, compromise the lanthanum halide performance. Example spectra, detector comparisons and results will be shown.

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