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Development of a High-Resolution Alpha Spectrometer (HRAS) Detector System

Measurements by alpha spectrometry are required for a number of applications, including: nuclear forensics, nuclear decommissioning, environmental monitoring, nuclear medicine, and refining nuclear data. Low-resolution alpha spectrometer systems are widespread, but often the resolution is too poor to accurately determine activities of sources or identify contaminants in an unknown sample. High-resolution alpha spectrometry can resolve these issues. However, whilst it is possible to purchase high-resolution Passivated Implanted Planar Silicon (PIPS) detectors, suitable detector chambers are not commercially available. The Joint Research Centre (JRC), Geel, and The Centre for Energy, Environmental and Technological Research (CIEMAT), Madrid, are known to have developed custom detector systems suitable for making high-resolution measurements. This work describes the work done to build the new HRAS system at NPL, which will be used to develop accurate and precise alpha-particle emission intensity data for medical and forensic relevant radionuclides. This will contribute to the national challenge of developing confidence in the data being used in pre-clinical and clinical studies for cancer treatment and nuclear forensics.

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