

CLYC Scintillators: A Possible Enhancement for Handheld OSI Detectors

Many detection systems detect either gamma or neutron radiation or combine the detection of both nuclear radiation types by integrating two detectors in one system. For hand-held systems a very small 3He-tube is often combined with a scintillation crystal of e.g. NaI or LaBr₃. The recently developed detector material CLYC promises to detect gammas and neutrons simultaneously with good resolution and efficiency for fast and reliable isotope identification and efficient neutron counting. In the paper we report on tests with a CLYC detector. The scintillation material of CLYC-detectors (Cs₂LiYCl₆:Ce) contains enriched ⁶Li. Via the nuclear reaction ${}^{6}\text{Li}(\text{n},\alpha){}^{7}\text{Li}$ alpha particles and high energetic tritons are generated by neutron radiation. The ions generate a light pulse while travelling through the crystal. Gamma radiation excites electrons in the scintillator. Neutron and gamma radiation have a unique pulse shape, enabling the distinct discrimination of induced pulses. New detector materials like CLYC, which are able to detect gammas and neutrons simultaneously, may lead to a new type of small and efficient hand-held devices. These detectors have the potential to improve the detection of nuclear and radioactive material and may be used successfully in OSI.

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