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Scintillators for nondestructive assay in industrial and security applications

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Radiation detectors of various types (gas detectors, semiconductors, scintillators) are widely used in industry to implement nondestructive nuclear measurement techniques such as X-ray imaging, gamma spectroscopy, passive neutron coincidence counting, active neutron interrogation, or neutron and photon activation analysis. Currently, scintillators are becoming increasingly popular due to their fast response, their robustness for in situ and on-line measurements, their ease of use with most digital acquisition electronics, their wide range of scintillation materials, with the constant development of new scintillators, and last but not least, their attractive cost when high efficiency is required. We will present a non-exhaustive review of current applications and R&D studies involving scintillators, in the fields of radioactive waste characterization, uranium or oil exploration and exploitation, dismantling and decommissioning of nuclear facilities, homeland security, and waste recycling for the circular economy. We will highlight some cases where scintillators offer a cost-effective and valuable alternative to semiconductor or gas detectors.

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