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Nuclear resonance fluorescence in U-238 using LaBr detectors for nuclear security TAKEHITO HAYAKAWA, Japan Atomic Energy Agency, HANI NEGM, HIDEAKI OHGAKI, IZURU DAITO, TOSHITERU KII, HEISHUN ZEN, Kyoto University, MOHAMED OMER, Assiut University, TOSHIYUKI SHIZUMA, RYOICHI HAJIMA, Japan Atomic Energy Agency — Recently, a nondestructive measurement method of shielded fissional isotopes such as 235U or 239Pu has been proposed for the nuclear security. These isotopes are measured by using nuclear resonance fluorescence (NRF) with monochromatic energy gamma-ray beams generated by laser Compton-scattering (LCS). We have proposed that one measure scattered gamma-rays from NRF with LCS gamma-ray beams using the LaBr3(Ce) detectors. The LaBr3(Ce) crystals include internal radioisotopes of a meta-stable isotope 138La and alpha decay chains from some actinides as 227Ac. There is a broad pump at about 2 MeV. This pump is considered to be an overlap of alpha-rays from decay chains of some actinides but its detailed structure has not been established. Here we have measured NRF spectra of 238U using the LCS gamma-rays with energy of about 2.5 MeV at the HIgS facility of the Duke University. The background has been evaluated using a simulation code GEAT4. The 9 peaks, 8 NRF gamma-rays plus the Compton scattered gamma-ray of the incident beam, are finally assigned in an energy range of about 200 keV at about 2.5 MeV. The 8 integrated NRF cross-sections measured by LaBr3(Ce) have been consistent with results by an HPGe detector. The three levels are newly assigned using the HPGe detector. Two of them are also measured by LaBr3(Ce).

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