PRODUCTION OF ISOTOPES AND ISOMERS WITH IRRADIATION OF $Z = 47 - 50$ TARGETS BY 23 MeV BREMSSTRAHLUNG

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Irradiations of the Ag to Sn targets by bremsstrahlung were performed at 23 MeV electron beams of the M*T*-25 microtron. Gamma spectra of induced activities have been measured and the yields of all detected radio-nuclides and isomers were carefully measured and analyzed. A regular dependence of yields versus changed reaction threshold is confirmed. Many isomers were detected and the suppression of production probability is observed when the product spin is increased. Special peculiarities for the isomer-to-ground state ratios were deduced for the ^{106m}Ag, ^{108m}Ag, ^{113m}In, ^{115m}In, and ^{123m}Sn isomers. The accumulations of ^{108m}Ag, ^{115m}In, ^{117g}In, and ^{113m}Cd nuclides are of interest for applications, especially when economic production method is available, as in the case of microtron. The In species are promising for therapy of patients. The ^{108m}Ag and ^{113m}Cd long-lived isomers are considered for energy storage because definite schemes are visible for energy release by demand with depletion of these excited isomeric states. As a first step for the isomer depletion experiment, their accumulation in μg to mg amounts is required. The presently measured yields supply a basis for estimates of the production rates. Photon-induced reactions at low/moderate energy, ≤ 30 MeV, offer the most productive and economic options for the listed above applications. At higher energies many reaction channels are open in competition and many background activities are produced with suppression of the yield for the specially selected one. The theoretical analyses of yields are complicated in addition. After processing of our data taken at low energy, we succeeded to establish the following peculiarities in the reaction yields: a) the inversion of the spin values for the ground and isomeric states of the In nuclides makes an effect in anomalous isomer-to-ground state ratios *m*/*g*; b) the decay chains of the ^{115}Cd, ^{117}Cd *m* and *g* species allow the production of ^{115m}In and ^{117g}In radio-nuclides for medical application in an advantageous mode of the "generator" scheme similar to the one widely-used at the case of ^{99m}Tc; c) accumulation of the long-lived ^{108m}Ag and ^{113m}Cd isomers through the (γ, n) reaction is quantitatively characterized being of interest in a view of potential "triggering" experiments for the isomeric energy release; d) the reduced *m*/*g* ratio observed for ^{108m}Ag may supply an evidence for the microscopic-structure influence onto the isomeric yield despite the reaction is typically attributed to the statistical mechanism. Some other cases of such an influence were recently discussed in [1].

1. S.A.Karamian // Proc. QFTHEP Workshop, Repino, St.-Petersburg, 2013; http://pos.sissa.it.