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Identification of reaction products in ^{50}Ti + ^{249}Cf reactions at TASCA *

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During the last decades heavy ion induced reactions were applied to explore the chart of nuclei up to the superheavy elements (SHE), which has resulted in the discovery of the SHE up to Og ($Z = 118$) in complete fusion reactions [1]. Alternatively, recent model calculations suggest the possibility to produce exotic nuclei including SHE in non-fusion channels of heavy ion induced reactions [2]. Pioneering studies on the possible production of such exotic nuclei in non-fusion reactions were performed in the late 1970s by applying chemical separation techniques [3], which are suitable for longer-lived nuclei ($\gtrsim$1 h). Many properties of the multi-nucleon transfer reactions have been established, but still detailed information on the reaction mechanism/kinematics is missing [5, 6, 4].

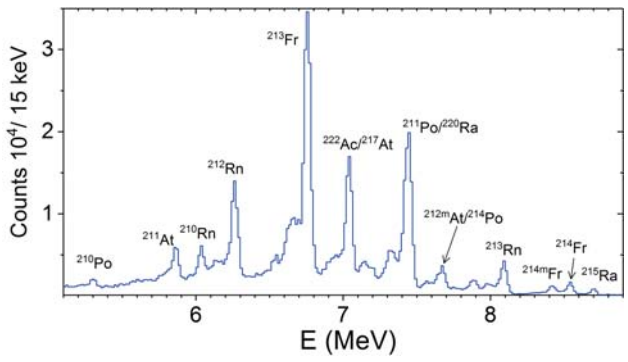

Figure 1: Energy spectrum measured with the focal plane detector during beam-off periods for the ^{50}Ti + ^{249}Cf reaction. Isotopic identification of some lines is given.

Recently, at the velocity filter SHIP new short-lived (down to 10^{-6} h) neutron-deficient nuclei of heavy elements have been synthesized in the ^{48}Ca + ^{248}Cm reaction [7]. These and other results at SHIP (see [8]), benefiting of the kinematic separation, demonstrate the relevance of the forward angle measurements for the investigation of the reaction dynamics.

At the gas-filled recoil separator TASCA, non-fusion products of the ^{50}Ti $+^{249}$ Cf reaction have been investigated. They were produced during the experiment for searching the SHE with $Z = 120$ [9]. The magnetic settings of TASCA were tuned to collect the products of fusion-evaporation reactions, but even under these conditions some amount of non-fusion products were passing through TASCA and were implanted into the focal plane detector. Here their subsequent radioactive decays were measured. A typical energy spectrum containing lines from the α decay of the implanted nuclei is shown in Figure 1. By exploiting the α decay properties, the identification of nuclei was performed employing a position and time correlation analyses between implantation and/or α-like events. In total, 57 isotopes with $Z = 83 - 90$ were identified.

Experimental details and the final analysis will be given in a forthcoming publication [10].

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