Nickel-Backed Bi Targets for the Production of ^{211}At

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ABSTRACT

To support clinical trials for cancer therapy with radiotherapeutic isotopes in the United States reliable sources of adequate quantities of several such isotopes, especially of alpha emitters such as ^{211}At, are a high priority of the DOE Isotopes Program. The isotope ^{211}At (half-life 7.2 hours) is usally produced via ^{209}Bi(α, 2n)^{211}At using a 28 MeV alpha beam. We have recently tested an alternative reaction, ^{209}Bi(^{6}Li, 4n)^{211}Rn (which decays to ^{211}At) with a 42 MeV ^{6}Li beam from the ATLAS superconducting linac. This latter reaction has the advantage that radon gas is easy to extract and the 14-hour ^{211}Rn half-life allows more time for transport to the therapy facility.

The Bi targets were prepared on a Ni backing as these elements have similar coefficients of thermal expansion, minimizing the chance of target delamination. The nickel backing was mounted in contact with a Cu heating plate assembly to help assist evolution of the Rn gas. A helium gas jet was passed in front of the target to collect the ^{211}Rn and transport it to a charcoal trap. In the near future we will test the release efficiency of noble gases from Bi as a function of temperature using a stable Xe beam and a highly sensitive residual gas analyzer. Details of the Bi target production and performance will be presented as well as some initial experimental results.

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