Contribution ID: **44** Type: **Verbal**

PC-controlled radiochemistry system for preparation of NCA ⁶⁴Cu

Due to the rapid increase of the use of nuclear medicine techniques in modern clinical diagnosis and in a selected series of therapies, researchers efforts are focusing for the standardization and optimization of different production routes for a series of emerging radioisotopes like 64Cu, 67Cu, 114mIn, 211At.
In particular the EC/β+/β- decay of 64Cu makes it a promising candidate for both PET imaging and internal targeted radio therapy. In the last decades several groups studied different production routes like for this radio nuclide, i.e. 64Ni(p,n), 64Ni(d,2n),64Zn(d,2p).
Taking into account the wider availability of the medium energy proton beam machines, the (p,n) reaction on 64Ni seems to be the most attractive one, although 64Zn(d,2p) may be considered as an alternative where lower activity is necessary, as it may require less investment in enriched material.
The production of large activities of 64Cu on regular basis requires a fast and reliable chemistry system. Based on the experience gathered in the last decades in our laboratory we present here and efficient, remote controlled chemistry system for production of the non carrier added 64Cu via 64Ni(p,n) reaction.
To avoid excessive investment in a gold target carrier, a good practice is to coat the copper target carrier with a thin inert material, i.e. 5-6 μm of gold, followed by electrodeposition of the 64Ni target layer. In that way, the cross contamination of the non carrier added 64Cu with the copper present in the target carrier is excluded. In general the irradiations are performed with protons having incident energy of about 15 MeV, and, depending on irradiation condition, may lead to curie amount of induced activity of 64Cu. To reduce the thickness of the 64Ni target layer, and, as consequence, to minimize the problems related with the plating and dissolution of the target layer, a low beam/target angle geometry (6 degrees) is desired. Nevertheless, the separation of target / activation product is required. Upon irradiation, our chemistry system proposes the dissolution of the 64Ni layer in a heated flow trough stripper by means of diluted nitric acid. Next, the non carrier added 64Cu is selective extracted into benzene (containing 0.1 M benzoylacetone) at pH 4.5, leaving the enriched 64Ni and possible Co induced isotopes in the inorganic phase. The back extraction of 64Cu is done in a small volume of diluted hydrochloric acid (6 N). The final purification step is achieved using an anion exchange column Dowex 1X8. Finally, the NCA 64Cu is eluted with a small volume (10 ml), diluted hydrochloric acid (1 N).
The overall yield of the chemistry is estimated as being higher than 95% with a short total chemistry time, less than 3 hours, while the gold plated target carriers can be reused as long as the thin gold layer remains intact, meaning that scratches and cracking by careless handling are avoided.

Primary author: Mr ADAM REBELES, Razvan (Vrije Universiteit Brussel, Cyclotron Laboratory)

Co-authors: Mr DE VIS, Ludo (Vrije Universiteit Brussel, Cyclotron Laboratory); Prof. VAN DEN WINKEL, Pierre (Vrije Universiteit Brussel, Cyclotron Laboratory); Mr WAEGENEER, Rene (Vrije Universiteit Brussel, Cyclotron Laboratory)

Presenter: Mr ADAM REBELES, Razvan (Vrije Universiteit Brussel, Cyclotron Laboratory)

Track Classification: Production and Application of Radionuclides