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# The ISOLPHARM project: New production method of high specific activity beta-emitting radionuclides as radiopharmaceutical precursors

At INFN-LNL the SPES facility for the production of radioactive ion beams is constructing. This RIB new facility, besides being operated for nuclear physics studies, may play a pivotal role in the production of medically relevant radionuclides by means of the ISOL (Isotope Separation On-Line) technique.
The production of the radioactive isotopes will be obtained by nuclear reactions induced by 40 MeV protons, accelerated by a cyclotron, that will collide on a multi-foil UCx target in order to dissipate the 8 kW beam power generated by the reaction.
The reaction products will be extracted from the target by evaporation at high temperature (about 2000 ℃), then forced to pass through a transfer tube towards an ionization cavity, where they will be ionized to the 1+ state.
The core of the method is the possibility to obtain pure isobaric beams following mass separation; in this way no isotopic contaminations will be present in the beam and afterwards in the trapping substrate. Only potential isobaric contaminations can affect radiochemical and radionuclide purity, but proper methods can be developed to separate chemically different elements
The goal of the ISOLPHARM project is to provide a feasibility study for an innovative technology for the production of extremely very high specific activity beta emitting radionuclides as radiopharmaceutical precursors. This revolutionary technique will allow to obtain radiopharmaceuticals, impossible in most cases to obtain in the standard production facilities (neutron reactors or cyclotrons), with lower costs with respect to traditional techniques and reduced environmental impact.
The ground-breaking idea of the ISOLPHARM method was granted an International patent (INFN).
The steps to be addressed for the preparation of the radiopharmaceutical are: 1) Trapping of the radionuclide of interest present in the beam by means of the construction and placement of a suitable substrate; 2) Preparation of a medicinal product compatible with the method of administration; 3) Agreement with the requirements of quality guaranteed by compliance with the principles of Good Manufacturing Practice (GMP) in the field of radiopharmaceuticals.

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