

Techniques elaborated for the R&D on fission targets for SPIRAL2

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The SPIRAL2 fission target must fulfill restrictive specifications to ensure an efficient production of neutron-rich isotope beams. The realization of such a target requires a thorough program to develop the appropriate uranium carbide (UC_x) material. In particular, the material should provide a high fission yield and allow a fast release of the fissions products. These requirements can only be reached by finding an optimization between the material density and its porosity.

A R&D program has been set up at IPNO and Sciences Chimiques de Rennes to elaborate techniques of synthesis and characterization. First, three different processes for the UC_x material synthesis have been selected for investigation: the carbothermal reduction of uranium oxide mixed with graphite [1-3], the carbothermal reduction of uranium oxalate [4-5] and the direct melting of a mixture of metallic uranium and graphite by electrical arc [6].

Each of the three processes requires careful techniques to manufacture and to check the product at the various stages.

To determine the process which best suits the specifications, we first have to understand how the different parameters of the synthesis process affect the material. For this purpose, we are carrying out systematic characterization measurements on the samples: determination of the material composition, measurement of density and porosity, evaluation of grain sizes and measurement of the pore size distribution.

The implementation of the different synthesis processes of the UC_x material and the measuring devices for the material characterization will be described in details.

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