An Overview of the Status of MAFF

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The Munich Accelerator for Fission Fragments (MAFF) [1] will be installed at the through-going beam tube SR-6 at the new Munich high-flux reactor FRM-II. In this article we will summarize the progress of the MAFF project in 2001 while referring to separate contributions which are dealing with particluar topics in more detail.

The safety concept of MAFF has been elaborated in greater detail including the use of piggyback-valves at the beam extraction side and will be further concretized.

In spring 2001 many metal sealings in the FRM-II have been exchanged in order to improve corrosion resistance. Consequently, also the MAFF beam tube has been dismounted and remounted with the new (gold and silver lined) sealings.

Several different graphite varieties have been analyzed and investigated with respect to the amount of uranium that can be dispersed in the porous graphite and the homogeneity of the uranium distribution [2]. The latter can be easily visualized by REM photographs. Among the various materials and methods ("normal" doping, pressure-enhanced doping) an optimum procedure has been found that will be used for further tests.

As some modifications were necessary in the heat-shield mounting of the high temperature furnace for target tests, no long-term tests of the target container have yet been performed. The investigation of the long-term behaviour of the target with respect to mechanical stability and chemical compatibility will, however, be one of the next important tasks. In case that difficulties related to a direct contact between rhenium and uranium should occur, the use of a vitreous carbon inlet between metal container and porous graphite is foreseen. Contrary to fission products, the mobility of uranium carbide in graphite is rather low, and vitreous carbon has the potential to act as an effective diffusion barrier.

A prototype of the MAFF target/ion source unit has been built in order to perform various tests [3]. The effectiveness and reliability of the electron beam heating is crucial for a successful operation of the source. Furthermore, the knowledge of the temperature distribution within the ion source is very important for the diffusion speed and ionization efficiency of the fission fragments as well as for the durability and performance of some highly stressed BeO insulators, whereas the temperature of the rear contacts should be sufficiently low to prevent problems when dismounting the source. In order to work properly, the source must be capable to emit and ionize (alkali and alkaline earth) atoms with ion optical characteristics that match the downstream lens system. Such tests can and will be performed at the source test setup at the accelerator laboratory.

A test beam tube that represents the FRM-II reactor beam tube has been set up at the accelerator laboratory [?]. It will allow to study the behaviour and functionality of all in-pile parts of MAFF in real geometry with easy access in a non-radioactive environment. The first components that will be investigated in the test beam tube are the above mentioned target/ion source unit and a prototype of the MAFF cryopanel [4]. The latter has already been ordered and will work with cold helium supplied by the existing refrigerator. The knowledge of pumping efficiencies for various gases in a given configuration and a rather precide estimate of thermal loads will help to find an optimum configuration for MAFF.

Finally it should be mentioned that the successful commissioning of REX-ISOLDE at CERN in the second half of 2001 confirmed the concept to combine effective charge breeding with a compact linac for post-accelerating radioactive ions as well as the design of the linac itself. Both will be used in a similar way for MAFF.

References

[1] D. Habs *et al.* (eds.), *MAFF – Physics Case and Technical Description,* Oct. 1998, `http://www.ha.physik.uni-muenchen.de/maff/`

[2] H.-J. Maier *et al.*, this report, p.80

[3] F. Ospald *et al.*, this report, p.71; Annual report 2000, p. 75

[4] P. G. Thirolf *et al.*, this report, p.81