Overview of IFMIF/DONES and testing of materials for DEMO

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In the last few years new Fusion Roadmaps have been developed in a number of countries. Generally speaking, most of them foreseen the construction of a Demonstration Reactor (DEMO) as a single step between ITER and the Fusion Power Plant. A general tendency is apparent to speed up the design and construction phase of DEMO (in the case of EU it is foreseen to start its construction during the 2030 decade). In this framework, the need of a fusion relevant neutron source for the qualification of the materials to be used in DEMO and in the Power Plant was clear from the start of the nuclear fusion developments. Intense discussions over the years concluded that an accelerator-based source utilizing deuteron-lithium nuclear reaction with a broad energy spectrum peaked at around 14 MeV would be the best choice for a materials irradiation facility, giving rise to the International Fusion Materials Irradiation Facility (IFMIF) project, proposed to be such dedicated facility. Present approach propose a staged approach to IFMIF in which its construction can be developed in two phases: a first one focused on DEMO needs, that is called IFMIF-DONES (DEMO Oriented Neutron Source) and a second one oriented to the Power Plant needs.

In this work, it will be presented and overview of the DEMO needs in relation of fusion-like irradiations for materials qualification. They define the main requirements of the IFMIF-DONES facility. It will be also presented the present status of the IFMIF-DONES design activities, presently carried out in the framework of the EUROfusion Consortium and based on the IFMIF Engineering Design activities developed in the framework of the IFMIF/EVEDA project. It will be also discussed the possible use of the IFMIF-DONES facility for other applications without impacting significantly on the main target.