

An overview of STIP results – lifetime assessment of components in spallation targets

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Irradiation experiments (STIP) in the targets of Swiss spallation neutron source (SINQ) at the Paul Scherrer Institute were started in 1998. More than nine thousand specimens of various Fe-, Ni-, Al-, Zr-, and W-alloys etc. were irradiated in a wide range of irradiation dose 2-30 dpa (in Fe) and temperature of 80-550 °C, with 20-100 appm He/dpa and 200-400 ape H/dpa depending on the materials and the local conditions of the irradiation position in a SINQ target.

To date, numerous specimens of austenitic steels (SS316L(N), JPCA), ferritic-martensitic steels (T91, EM10, HT9, F82H, Eurofer etc.), Ni-alloys (Inconel 718 and Inconel 600), Al-alloys (AlMg3 and Al-6061), Ti-alloys (Ti6Al4V and Ti-Zr) have been tested. The materials cover a large part, if not all, of the structural materials used in the present spallation targets worldwide. In addition, the irradiation conditions in terms of dose and temperature range of the STIP specimens also cover those of the spallation targets. Therefore, the post-irradiation examination results of STIP specimens have been widely used, particularly for those spallation targets operating at 1 MW level.

In the presentation, an overview of STIP results will be given. The limiting factors for various materials under different conditions are discussed, which can be very useful to the lifetime evaluation of important components such as target containers or proton beam windows in spallation targets.

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