Oxide dispersion strengthened (ODS) ferritic alloys produced by mechanical alloying followed by hot consolidation such as MA957 ODS (14%Cr 1% Ti 0.3% Mo 0.25 Y_2O_3 bal. Fe, in wt%) were shown to contain a high number density of nm-scale clusters enriched in Y, Ti, O. These particles are believed to act as efficient recombination sites for vacancies and interstitials and there is experimental evidence that these clusters can trap high concentrations of helium in very small bubbles. It is therefore expected that such ODS steels should exhibit a good resistance to radiation embrittlement especially in cases where large quantities of helium are generated by transmutation as in fusion or spallation environments.

In order to test this hypothesis, MA957 miniature tensile specimens were irradiated with high energy protons and neutrons in the SINQ spallation target at Paul Scherrer Institut. The average irradiation temperatures of the specimens ranged from about 110 to 360°C and the maximum displacement damage dose was 20 dpa, corresponding to an accumulated helium content of about 0.2 at%. Tensile tests were carried out at room temperature, 250 and 350°C and following testing, the fracture surfaces of selected specimens were characterized by Scanning Electron Microscopy. The tensile properties of the irradiated MA957 specimens were compared to those and of 9Cr-1Mo martensitic steels irradiated in identical conditions in order to assess the resistance of ODS steels to irradiation and helium induced embrittlement.