

# **Study of wettability of Eurofer steel by the liquid metal sodium-potassium (NaK-78)**

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## **Abstract**

The main mission of the International Fusion Materials Irradiation Facility (IFMIF) is to provide irradiation conditions, similar to those of the DEMO fusion reactor, for several testing capsules packed with specimens of Eurofer steel which is the main candidate as a structural material for the first wall and blanket of the fusion reactor. Using the liquid metal sodium-potassium alloy (NaK-78) to fill the small gaps among the Eurofer specimens was introduced to improve the thermal conduction among the specimens and achieve uniform temperature distribution. Hence, the wettability of Eurofer specimens by NaK is investigated by two experiments to evaluate the success of this concept. In the first experiment, a stack of IFMIF Eurofer specimens is packed in a steel capsule that has two sides of glass to observe the NaK filling process by video recording. The specimens and NaK are heated up to 400°C by two heaters attached to the capsule. The NaK flow in the capsule and wettability of the specimens are evaluated. The second experiment has two Eurofer strips, with a gap between them, placed in a temperature-controlled crucible filled with NaK to study effect of: (i) NaK temperature, (ii) surface roughness of the Eurofer strips, and (iii) gap size on the wettability of these Eurofer strips. The results of these experiments are summarized and discussed in this paper.