JOINING METHODS OF BE/FMS FOR ITER TBM FIRST WALL

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A double-layered structure with plasma facing armors (Be and W) and structural materials (ferritic martensitic steel; FMS) is designed for the first wall of an ITER test blanket module (TBM). The fabrication of Be/FMS as well as W/FMS joints was investigated by introducing several manufacturing processes. Because of the usual brittle fracture at the material interfaces, thick diffusion barriers of interlayer materials was formed prior to the joining of Be and W on FMS. The diffusion barrier of Cu film, Cu plate resulted in a successful joining. In addition, the types of interlayers and method of their forming affected the joining properties. In this study, the interlayers were formed by using a conventional physical vapor deposition (PVD), a hot isostatic pressing (HIP), and an explosive welding. The joints revealed a good mechanical properties without degradation of the mother alloys. The presentation would bring up to date on the activities for the joining of Be/FMS and W/FMS in Korea. In particular, some of the fabricated TBM joints of Be/FMS was high-heat flux tested with KoHLT-1 in Korea Atomic Research Institute. A Be/FMS mock-up having Cr/Cu coating interlayers with explosive welded Cu plates survived in 1000 cycles at 0.5 MW/m^2 heat flux.

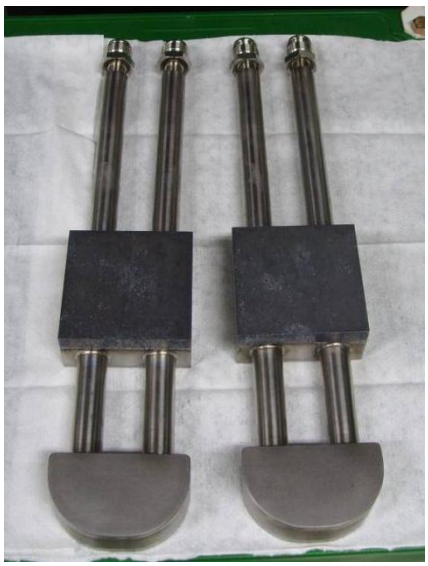

Figure 1: Fabricated Be/FMS TBM mock-ups