

Studies on high temperature vacuum brazing of Tungsten to Tungsten alloy materials for DEMO divertor application

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This work summarizes the experimental studies on joining of tungsten based refractory materials at high temperature using vacuum brazing process. The objective of the joining of these refractory materials is to develop the joining technique for fabricating helium cooled divertor target relevant to DEMO fusion reactor. These so called - divertor fingers - are expected to handle the incident heat flux of 10MW/m², to be cooled by multiple helium jet at high pressure (~ 10MPa) and high temperature (~ 600 deg C) helium gas environment. For joining of W (tungsten) to WL10 alloy (tungsten + 1% Lanthanum oxide), high temperature vacuum brazing has been performed at temperatures above 1000 deg C using selective brazing fillers using Gleeble-3800 thermo-mechanical simulator at IPR. For pre-qualification of the brazed joints, the brazed specimens are subjected to 500 nos. of thermal cycles at 950 deg C to 800 deg C using Gleeble-3800 system. The brazed joints are characterized by Non destructive testing (NDT) - Ultrasonic Testing (UT), microstructural and mechanical characterization. The experimental methodology and results of the characterization will be presented in the paper.

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