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ABSTRACT`

The paper describes the design and examination of Ti/Cu double interlayer to produce a joint between tungsten and steel. Partial transient liquid phase diffusion bonding was performed by a double stage bonding process. To join tungsten to steel, the brazing of steel to a Cu interlayer (500 μm) was carried out at 1050 ℃ followed by transient liquid phase diffusion bonding to tungsten using an active Ti interlayer (25 μm) at 1000 ℃. Microstructural evolution was studied at different bonding times (5, 15, 30, 60 and 180 min) to reveal the diffusion behavior of Ti atom in the interfacial zone between W and Cu. With the increase of the bonding time, the inserted active Ti interlayer and the formed Ti–Cu base intermetallic phases tend to be molten and consumed by the formed liquid alloy in the W–steel joint, while the tensile strength of the joint increases. The strength of the bonded specimens is as high as 412 MPa at the bonding time of 180 min. This technique provides a reliable method of bonding W to steel.

Keywords: Tungsten; Partial transient liquid phase bonding; Microstructure; Tensile strength.

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