77th IIW Annual Assembly and International Conference on Welding and Joining
7-12 July 2024
Rhodes, Greece

OP 129

Effect of bonding temperature on microstructure and mechanical properties of Ti2AlNb diffusion bonded joint

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This paper conducts diffusion bonding of Ti2AlNb based alloy, in which a pure Ti foil was used as the interlayer. The interlayer is used to eliminate bond line, which can cause brittle fracture of the joint. Ti2AlNb alloys were successfully bonded by vacuum diffusion bonding using pure Ti foil. The microstructures of joints were investigated by scanning and transmission electron microscopy (SEM and TEM, respectively). The results show that bonding joint was bonded effectively and bond line was eliminated. At 900℃, the continuous bulk dark gray phase appear in middle layer zone, with the increase of bonding temperature, the continuous bulk dark gray phase in middle layer zone gradually decreases and finally disappears. The microstructure evolution of joints was attributed to the mutual diffusion of elements. The maximum tensile strength of the joint was 920MPa, accounting for 98% of tensile strength of Ti2AlNb base metal and 116% of direct diffusion bonding. The maximum impact toughness is 5.3 J/cm2, which is 90% of the base metal under the same temperature. The successful bonding of Ti2AlNb using Ti as the interlayer provides theoretical support to bond Ti-based intermetallic compounds.