

은계 삽입재를 이용한 Ti-STSS 이종접합 특성 연구

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In recent years, there has been strong interest in producing transition joints of titanium (Ti) to stainless steel (STS). This combination of materials finds widespread applications in vessels and reactors in both the chemical processing and nuclear industries. In this study, brazing characteristics of Ti and STS using Ag-based fillers have been investigated with respect to the bonding strength of the joint. When Ti was directly brazed to STS using Ag-based fillers, various intermetallic phases such as Fe₂Ti, FeTi, TiCu and TiCu₂ were formed, which are very hard and brittle and impaired the bonding strength of the joints. Because the formation of these intermetallic phases in the joint are attributed to the active dissolution of the Ti base metal to the molten filler area during brazing, it is important to avoid the dissolution of the Ti base metal to the molten filler area to prevent the formation of brittle intermetallic phases. In this respect, the Ag interlayer on Ti was built up to prevent the dissolution of the Ti base metal during brazing. As a result, no intermetallic phase was formed in the joint and the joint was consisted of only Ag and Cu solid solution phases. This microstructure consisted of only solid solution phases improved the bonding strength of the Ti-STSS dissimilar joint. The tensile strength and elongation of the joined specimen using the Ti base metal having the Ag interlayer were 415 MPa and 5%, respectively. However, the fracture of the joined specimen using the Ti base metal without the Ag interlayer occurred at the strength as low as 60 MPa.

Keywords: Titanium, stainless steel, dissimilar brazing, Ag interlayer, Ag-based filler