Investigation of the mechanical properties and microstructure of the Ti-6Al-4V to Al2024 joint fabricated by successive- stage transient liquid phase (S-TLP) method

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Abstract
The aim of this study is investigation of TLP variables on microstructure and mechanical properties of Al2024 to Ti-6Al-4V bonding for TLP joint. For this purpose, the sheets were prepared with dimension of 130×32×3 mm from Ti-6Al-4V and Al2024 alloys and 50µm thick Sn-5.3Ag-4.2Bi foil as interlayer. Sn-5.3Ag-4.2Bi foil prepared with dimension of 32×25 mm. Two alloys was joint together by process of Successive stage Transient Liquid Phase (S-TLP). This process is contains two stages. The first one is Transient Liquid Phase (TLP) of Ti-6Al-4V and the second stage is diffusion bonding of Al2024 to Ti-6Al-4V. In the first stage, TLP process was used for joining of Ti-6Al-4V to Ti-6Al-4V samples. This process carried out under argon gas at 2 atmosphere and at 620 °C. After the end of first stage, the samples were broken from the joint region and then, the obtained surface was jointed to Al2024 with new interlayer. In the second stage, that is soldering, the samples were placed in furnace under argon gas at 2 atmosphere and at 453 °C. Maximum tensile strength of diffusion bonding was about 62 Mpa.

Keywords: Successive- stage Transient Liquid Phase (S-TLP), Transient Liquid Phase, Al2024, Ti-6Al-4V.