

## Low-temperature partial transient liquid phase diffusion bonding of Al/Mg<sub>2</sub>Si metal matrix composite to AZ91D using Al-based interlayer

### Abstract:

Partial transient liquid phase diffusion bonding of an aluminium metal matrix composite (Al/Mg<sub>2</sub>Si) to magnesium alloy (AZ91D) was performed using two heating rates. The influence of different heating rates on the microstructure, microhardness and shear strength has been studied. With a decrease in heating rate from 20 to 2 °C/min, the Mg content in the bond line decreased and the microstructure was altered. The composition and microstructure of the joined areas were examined by X-ray diffraction (XRD) and scanning electron microscopy equipped with energy dispersive X-ray spectroscopy (EDS). It was found that a heating rate of 2 °C/min resulted in an increasing in the shear strength of the joints. The kinetics of the bonding process accelerated due to the increase of solute diffusivity through grain boundaries of the metal matrix composite. Results suggest that Mg and Si contained in the interlayer favours the partial disruption of oxide films, facilitating the bonding process.