Micro-Welding Of High Thermal Conductive Material Aluminum-Graphite Composite By Pulsed ND:YAG Laser.

ABSTRACT

The development of advanced materials with superior high thermal properties and high specific strength has led to new metal matrix composites (MMCs) as a great attractive material in electrical and electronic industries. In order to manufacture more practical component from MMCs, a tech-nique for joining MMCs to other similar composites or monolithic materials is strongly required. Therefore, the reliable and economic joining technique is investigated to increase the applications of MMCs. In this study, the overlap welding of pure aluminum and super thermal conductive (STC) aluminum-graphite composite was experimentally and numerically investigated by using a pulsed Nd:YAG laser. In order to discuss the welding of dissimilar materials with different thermophysical properties, the temporal change of heat input was controlled by arranging the laser pulse waveform. The porosities and bumps were observed as the remarkable weld defects in the welding process without a pulse control. On the other hand, the weld bead was largely free of defects, and a size of bump was relatively small with the appropriate controlled pulse waveform. It was clarified that the laser welded joint of an aluminum and a STC aluminum-graphite composite could be successfully achieved with the better weld penetration stability by the appropriate controlled pulse waveform.

Keyword: Super Thermal Conductive, Aluminum-Graphite, Overlap Welding, Pulse Waveform