Analysis of Laser Microwelding Applied For Photonics Devices Packaging (14)

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Abstract:

Investigation and analysis of various parameters that effect the weld yield reliabilities in laser diode to single mode fiber coupling using lens coupling scheme are presented in this paper. The low power laser weldability of Invar, Kovar and stainless steel 304 alloys make the, suitable as the base materials and welding tools for different types of photonic devices packaging. The fiber attachment process and microwelds for fixing of various coupling component have been performed in what is so called active alignment process, where the system continues measuring the coupled power during the process of coupling and welding of (lens holder, fiber ferrule, and welding clips). Nd: YAG laser welding system (**LW4000S** from Newport) has been used for the alignment and welding of the coupling components inside a butterfly module. The effect of laser weld beam parameters on the weld dimension is optimized to get good and the desired weld width to penetration depth rations with small heat affected zones (**HAZ)** for achieving good welds without damaging the sensitive optical components inside the module. Result of modeling of laser pulse heating and penetration depth estimation agree very well with the experimental results. Samples have been characterized using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS) along with the metallographic characterizations. Low power pulsed Nd: YAG laser welding system (**LW4000S** from Newport) has been used for the alignment and welding of the coupling components inside a butterfly module. The low power laser weldability of Invar, Kovar and stainless steel 304 alloys make them suitable as the base materials and welding tools for different types of photonic devices packaging. To get god weld yields with the desired dimensions, laser pulse parameters such as (duration, peak power, repetition rate and umber of pulse shoots) as well as the focusing point position regarding to the sample and the angle of the incident laser pulse have to be optimized. Samples have been characterized using Scanning Electron Microscopy (SEM) and energy Dispersive X-ray Spectroscopy (EDS) along with the metallographic characterizations.