
Thermal conductivity of lead-free solder glasses

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Abstract

Solder glasses are commonly used to join metals to non-metallic materials such as glasses and ceramics in functional components and devices. It is important for the avoidance of a thermal barrier to control the thermal conductivity when introducing a solder glass into certain joints. In this context, different lead-free solder glass compositions in the system of bismuth and boron oxides and with low processing temperatures ($T_g < 500\text{ °C}$) were studied by shedding light on their thermal diffusivity and thermal conductivity using laser flash analysis. To improve the thermal performance, fillers of high thermal conductivity were added to the glasses. The study thus shows how the introduction of glass matrix composites can help to produce a heat-barrier-free solder without compromising the mechanical requirements in the joining process.

Keywords: thermal diffusivity, thermal conductivity, Laser Flash Analysis (LFA), solder glass

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