

**Laser-Assisted Bonding for Indium Solder:** As semiconductor components have become smaller, more complex and more highly integrated, there has been a growing emphasis on the issue of heat transfer between them. In particular, micro-LED displays, optoelectronic devices and microelectromechanical systems (MEMS) may have low heat tolerance and may experience degradation at high process temperatures. This means that effective soldering materials and processes are needed to address thermal issues during assembly. Indium solder is one of the most commonly used low-temperature solders, with excellent ductile properties and a low melting point (156.6℃.) It also exhibits superior electrical and thermal conductivity. However, the lack of standardized process parameters for indium soldering means that more research is needed in this area.

To derive the optimal process window, an ETRI-led team established process methods (including bonding techniques, materials, and conditions), and conducted experiments using laser-assisted bonding (LAB) at room temperature vs. traditional thermocompression bonding. The LAB process with indium solder demonstrated effective bonding and good reliability under all conditions with a laser irradiation time of five seconds or more. The findings also suggest that because the LAB process takes place at room-temperature, it reduces overall energy consumption and is attractive for use with heat-sensitive components.

**The images above** are schematic diagrams of the laser-assisted bonding flow.

**(Session 41, Student Poster Paper, “*Reliability of Indium Solder Joints using a Laser-Assisted Bonding (LAB) Process at Room Temperature*,” J. Jung et al, ETRI/Hanbat Nat’l Univ.)**