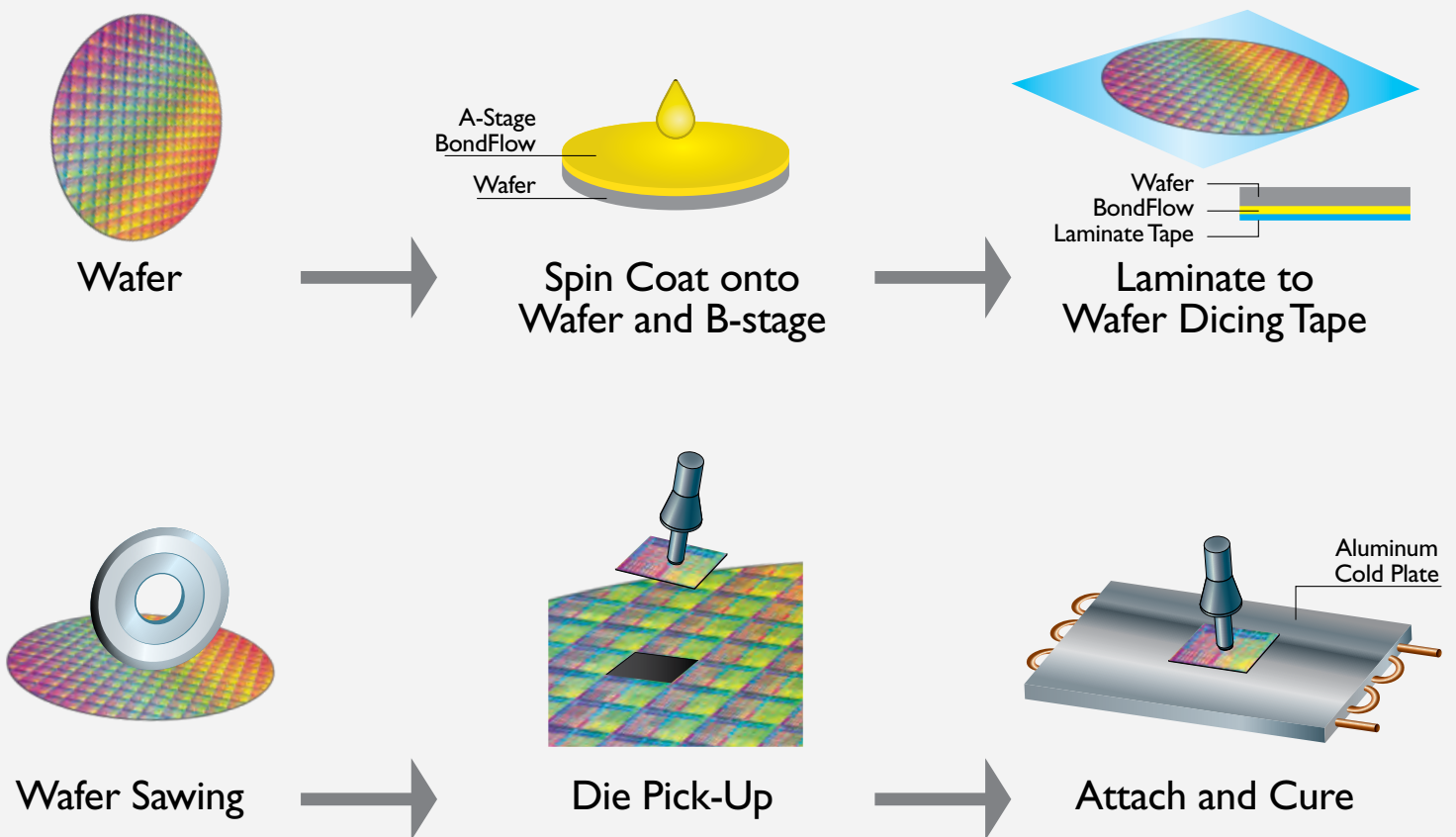


Automation of Die Attach Using BondFlow™ Adhesive



BondFlow™ Adhesive

The Challenge

Semiconductor chip assemblers desire a high throughput die attach process that minimizes both cost and the thermal impedance of the bonded dice. It would be advantageous to eliminate the need to dispense an epoxy dot beneath each chip, or position an epoxy or solder preform beneath each chip. The bondline should have minimal squeeze-out, and the top face of the chip should be parallel to the substrate. The thermal resistance of the bondline should be minimized. To reduce metallization cost, the die attach adhesive should stick to bare aluminum and to bare ceramics.

The Solution

Materion's BondFlow™ offers a new alternative to conventional die attach materials and addresses the challenges mentioned above. Our unique die attach adhesive is composed of thermoplastic polyimide and silver particles that provide good thermal and electrical conductivity. Polyimide is a tough material both physically and chemically and provides excellent thermal durability. It eliminates the dispense issues, since this adhesive can be spun or printed onto the backside of a wafer and B-staged prior to dicing. The thin bondline minimizes squeeze-out and tilt after cure.

A-staged BondFlow™ has a low enough viscosity to be deposited by spin coating, slot-die coating or printing. It can be deposited onto the backside of semiconductor wafers. The A-staged coating can be B-staged into a solid that is not tacky and has a long shelf life. Wafers coated with B-staged BondFlow™ can be diced into chips, eliminating the need to dispense epoxy or position a preform beneath the chip.

- Adheres well to: bare ceramics (Al_2O_3 , AlN, Si_3N_4); silicate (window) glass; metals (Ni, Al, ENEPIG-plated Cu), CVD diamond, and bare silicon.
- Can be tailored to a particular application by varying viscosity and the filler particles.
- BondFlow™ die attach is very 'automatable,' with short cycle times & high throughput.

BENEFITS

BondFlow™ is a user-friendly adhesive that can be spin-coated or printed onto a wide variety of surfaces.

- Spin-coated layers have excellent thickness uniformity
- B-staged layer is non-tacky and has a long shelf life at room temperature
- B-staged coating cures on a hot plate at 250°C after only 2 seconds at 200 – 750 kPa
- Curing increases the mp of the bondline so that multiple dice can be bonded at 250°C in tandem
- Cured bondline thickness is 3 to 20 μm to minimize thermal & electrical resistance
- Minimal squeeze-out and tilt
- Cured bond retains adhesion strength even after 3 minutes at 400°C
- Volume electrical resistivity as low as $8 \times 10^{-5} \Omega\text{-cm}$

POTENTIAL BONDFLOW APPLICATIONS

- Enables bonding of Si directly onto an aluminum heatsink
- Die attach of high power Si, GaAs or SiC dice onto plated Cu, Al, metal matrix composites & diamond
- High-temperature electronics
- Stacked dice, System in Package
- TIM2 applications, e.g. LED ceramic submounts onto Al heatsinks



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MATERION ADVANCED MATERIALS is an industry leader in providing durable and best-cost solutions for ceramic packages and hermetic cover/lids for the wireless infrastructure market. We offer a comprehensive portfolio of packaging materials and can customize package materials to satisfy your unique needs. Our high-reliability packaging also supports most configurations, applications and volume requirements. Because of our industry expertise, extensive global manufacturing capabilities and R&D proficiency, we are able to meet customers' packaging requirements today and partner with them to meet future challenges.