

Elevate® AuSn 8020

Eutectic Gold-Tin Alloy



Single step, stable, gold-tin alloy electroplating process

As the semiconductor industry continues to push for higher reliability, power, and overall increase in performance the properties of legacy solders like tin-silver can no longer meet these requirements. One alternative that is becoming the high-performance solder of choice is eutectic gold-tin. Gold-tin has many desirable properties compared to other solders as compared in Table A

The tensile strength and shear strength of gold-tin is much higher than other solders making it a much more reliable bond for high power applications that require long-term reliability. Although indium has higher thermal conductivity than gold-tin, the high Young's modulus of gold-tin allows the material to be deposited much thinner than indium and maintain a consistent flatness over a large area.

There are several methods for applying gold-tin: solder paste, solder preform, evaporation, plating by layers, and alloy plating. Of all these methods, alloy plating has been determined to be the most efficient and cost-effective. In addition, alloy plating is not limited by feature size or configuration.

	80 Au 20 Sn	96.5 Sn 3.5 Ag	63 Sn 37 Pb	Indium
Liquidus Temperature (°C)	300	221	186	156.6
Thermal Conductivity (W/mK)	57	33	50	84
Electrical Resistivity (x 10 ⁶ Ω·cm)	16	12	14	8.4
Tensile Strength (MPa)	275	39	34	1.9
Shear Strength (MPa)	275	32	28	6.1
Young's modulus (GPa)	68	56	35	10
CTE @20oC (PPM/oC)	16	30	25	29

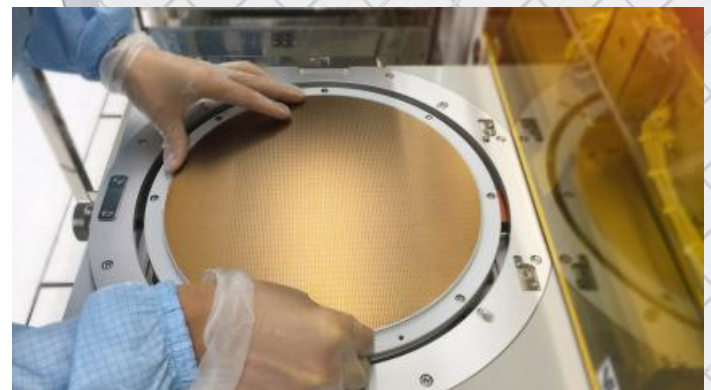
Elevate® AuSn 8020 is a one-step cyanide-based process formulated to deposit a eutectic or near eutectic gold-tin alloy. The alloy ranges from 75 – 82% gold content with a corresponding melting point of 280 °C – 320 °C.

Features

- One step, single bath process
- Capable of producing various alloys
- Simple to use and easy to control process
- Produces predictable and consistent gold-tin alloys
- Produces alloys with excellent reflow performance

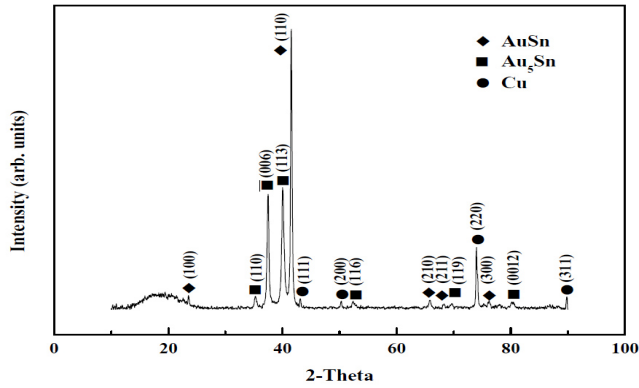
Benefits

- Reduces cost by being able to deposit on selective areas compared to evaporation processes that must deposit on the full wafer.
- Reduces cost by having the capability of producing a pure gold flash layer on top of the gold-tin alloy with the same chemistry. Eliminates the need to add an extra gold bath after the gold-tin process.
- Technology enabling chemistry. Unlike preforms, the chemistry is not feature size or deposit thickness limited.

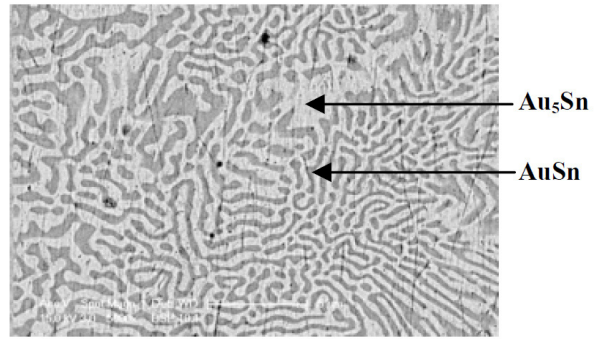


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Elevate® AuSn 8020 alloy is a mixture of two phases

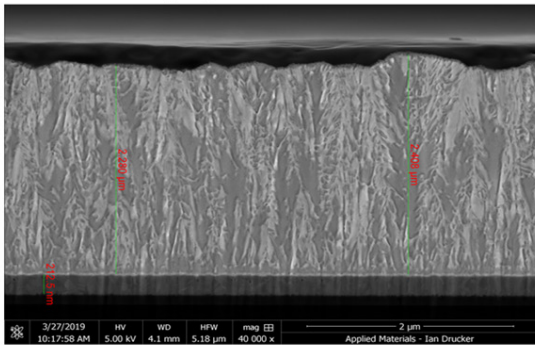


XRD spectra from an electroplated AuSn sample

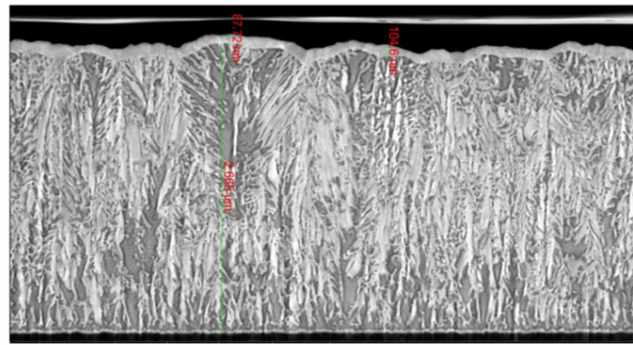


XCross-Sectional SEM image of a reflowed AuSn deposit. The lighter phase is Au5Sn and the darker phase is AuSn.

2.2 microns AuSn on laser diode bar with gold flash plated on AMAT Raider



Without Au Cap Layer

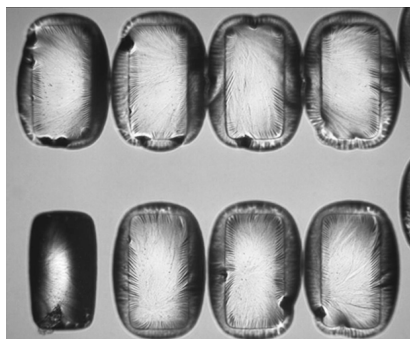


With Au Cap Layer (~100nm)

Reflow



Before reflow



Excellent reflow achieved between 280°C – 320°C