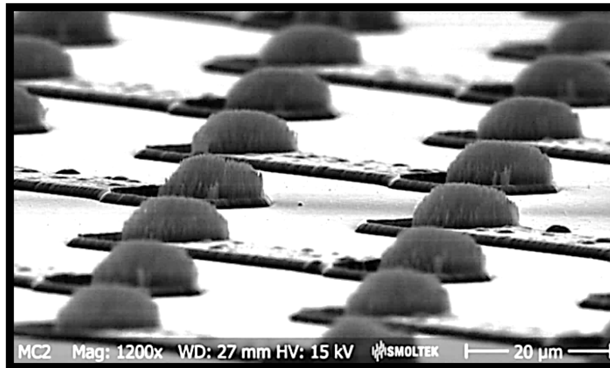
SmolINCO™

SMOLTEK
the game changer

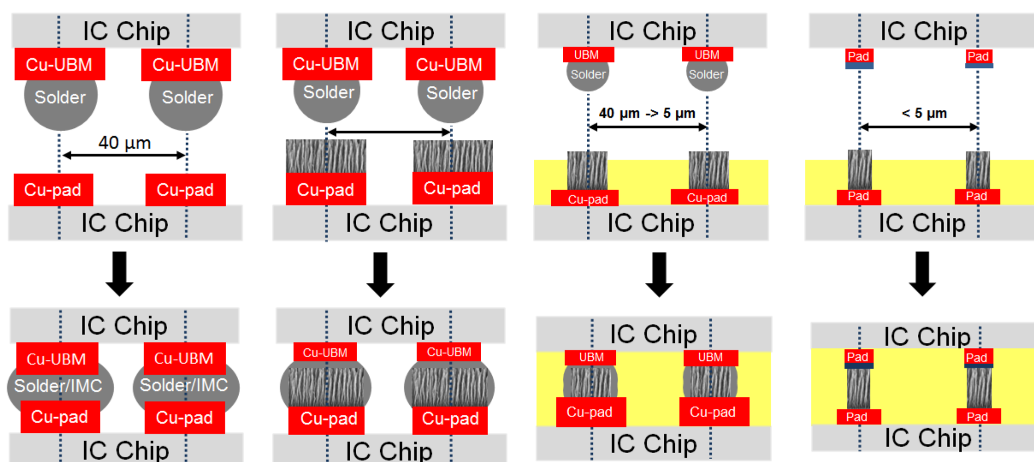
Carbon Nanofibers improve microbump interconnect reliability in Advanced Semiconductor Packaging



- CNFs enhance today's Cu-pillar interconnect technology by improving the reliability of the solder joint, particularly in the intermetallic alloy region at the interface between the two pillars.
- The solder wetting properties of metal-coated CNF efficiently confine the solder to the volume of the CNF-based microbump by capillary effect, allowing for smaller bump sizes, finer pitches and improved yield.
- CNF-based microbumps improve the alignment between adjacent chips by its excellent solder wetting properties.
- Nanoscale thermal conduction path significantly enhances heat dissipation from the packaged chips.

Improvement of overall performance and reliability of existing Cu microbump technology and smoothening of the scaling path down to ~5µm pitch, and beyond that solder free thermal compression bonding.

Smoltek µBumps Scaling Roadmap



Traditional flip chip: C4, reflow assembly and capillary underfill (UF).

Smoltek µbump approach: CNF on metal, void free solder wetting and thermo compression bonding.

Smoltek µbump near term: 40µm ⇒ 5µm
Cu-CNF composites, solder, TCB and capillary force to keep solder in place, high aspect ratio µbumps, wafer level UF.

Smoltek µbump longer term: 5µm ⇒ sub-micron
CNF-only µbumps, enhanced EM performance, less materials processing involved, wafer level UF.

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