

# Spherolyte<sup>®</sup> Cu UF 5

## Next generation copper pillar plating



Electronics

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## Pure and uniform copper deposits at high deposition speed

### High speed pillar plating for advanced packaging

Advanced packaging technologies using copper pillars have emerged as enablers of further miniaturization and enhanced performance. Driven by the increasing demand for faster and better performance, the industry is focused on technologies that provide higher throughput, exceptional reliability performance, and optimal yield. MKS' Atotech Spherolyte<sup>®</sup> Cu UF 5 process satisfies these requirements with pure and uniform Cu pillar deposits at high deposition speed.

The process is designed for standard pillars for flip chip application as well as new technological requirements such as mega pillar (tall pillar) plating.

### Features and benefits

- Purest copper deposit due to lower additive incorporation
- Excellent non-uniformity of < 5% at high speed plating
- Elimination of Ni diffusion barrier
- Excellent adjustable profile shape
- Fully analyzable additive system
- High speed plating capability up to 25 ASD
- Simultaneous processing of different pillar dimensions in one die for next gen hybrid designs

# Spherolyte<sup>®</sup> Cu UF 5 – Next generation copper pillar plating

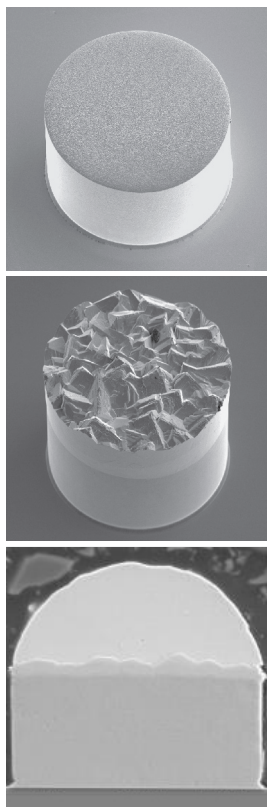


Figure 1-3:  
Cu pillar 1) before and 2) after SnAg deposition; 3) cross section of Cu/ SnAg pillar after remelting.

## Highest purity, void free copper deposition without a nickel diffusion barrier

The primary feature of the Spherolyte<sup>®</sup> Cu UF 5 process is the pure copper deposition, which is achieved through a lower incorporation of organic impurities of the additive system. Impurities (e.g. S, Cl) are found to be vastly below impurities of similar processes. Pure copper leads to lower void formation at the intermetallic phase after high temperature storage, and enables the elimination of the nickel-plating step, which is typically used as diffusion barrier to prohibit migration and voiding.

## Excellent profile control – adjustable via additive settings

Spherolyte<sup>®</sup> Cu UF 5 is designed to meet the toughest uniformity requirements at highest plating speed. It shows excellent coplanarity at high-speed plating conditions (< 5% within profile NU).

Additionally, the pillar shape can be adjusted through plating parameters to either flat, concave or convex surface structures – whichever you like and need.

Furthermore, our Spherolyte<sup>®</sup> Cu UF 5 product suite allows the simultaneous processing of different pillar dimensions (i.e., diameter, height) in one die – making it the electrolyte of choice for plating of next generation hybrid designs.

## Adjustable shape via additive control

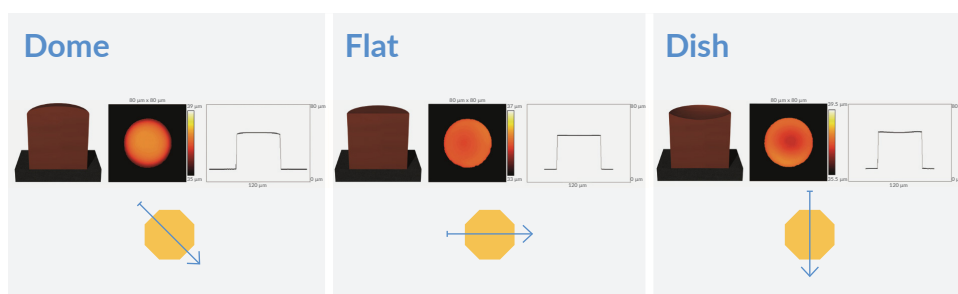


Figure 4-6:  
Confocal measurements of 1) dome-shaped 2) flat and 3) dish-shaped Cu pillars.

