

## Low-Temperature Sintering Copper Powder with Self-Reducing Properties via Polyol Process

Copper (Cu) powders for low-temperature sintering are capable of bonding at temperatures significantly below their melting point. Consequently, they are expected to be applied in die-attach materials for power modules designed for high-temperature operation.

To achieve low-temperature sintering, it is effective to refine the particle size. In the case of Cu, an anti-oxidation coating which decomposes at low temperatures is required due to its high susceptibility to oxidation.

In this study, synthesis conditions for fine Cu powders using the polyol process were investigated. The polyol process, reducing metal oxides in polyhydric alcohols, is suitable as it forms an organic surface coating during synthesis. This provides better dispersibility and oxidation resistance than aqueous methods.

The powder synthesized under optimal conditions exhibited significant sinterability from approximately 170 °C in an inert atmosphere. By holding the temperature at 200 °C for one hour, the sintering progressed to achieve a volume resistivity of 2.2  $\mu\Omega\cdot\text{cm}$ . Notably, it was clarified that the surface oxide layer was reduced during sintering, even under an inert atmosphere. This presentation discusses the thermal decomposition mechanisms of the organic species formed on the Cu surface and their contribution to the self-reducing properties that enable high-quality bonding at low temperatures.

### Professional Status of the Speaker

Doctoral or Master Student

### Interest in submitting a paper in a special issue of

No interest

### Invitation letter for visa

No

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