

## **Wettability and Shear Strength of Sn-Cu-Ni-xSi<sub>3</sub>N<sub>4</sub> Composite Solder**

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**Abstract.** The wettability and mechanical properties of solder the joint of Sn-Cu-Ni-xSi<sub>3</sub>N<sub>4</sub> had been investigated. In this study, five different silicon nitride (Si<sub>3</sub>N<sub>4</sub>) percentage addition were chosen (0 wt. %, 0.25 wt. %, 0.5 wt. %, 0.75 wt. %, and 1.0 wt. %). Contact angle measurement demonstrated that with Si<sub>3</sub>N<sub>4</sub> addition, the wetting performances had been improved with the decrease of wettability contact angle. It is believed that the Si<sub>3</sub>N<sub>4</sub> particles suppresses the interfacial IMC growth and thus improves the shear strength. Interfacial IMC thickness measurement and shear strength results showed that with thinner IMC layer (by increasing amount of wt.% of Si<sub>3</sub>N<sub>4</sub>), the higher the shear strength of the joint. Fracture surface of sheared samples shows a combination of both brittle and ductile fracture.

**Keywords:** Soldering alloy; Intermetallic; Silicon Nitride; Powder Metallurgy; Alloys