

Phase Equilibria in Zn-Al-Sn Alloy for Lead-free Solder Application

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Abstract : The effect of Yttrium addition on the microstructure and mechanical properties of Sn-Zn eutectic alloy, which has been attracting intensive focus as a Pb-free solder material, was investigated in this study. Phase equilibrium has been calculated by using FactSage® to evaluate the composition and fraction of equilibrium intermetallic compounds and construct a phase diagram. In the case of Sn-8.8 Zn eutectic alloy, the as-cast microstructure was typical lamellar. With addition of 0.25 wt. %Y, a large amount of pro-eutectic phases have been observed and various YZn_x intermetallic compounds were expected to successively form during cooling. Hardness of Sn-8.8 Zn alloy was not affected by Y-addition and both alloys could be rolled by 90% at room temperature.

Keywords : lead-free solder, zn-al-sn alloy, phase equilibrium, rolling, microstructure, hardness

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