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Investigation of wetting properties of binary Sn-Ag lead free solder alloys on copper substrates

In this study, surface and interface tensions of pure Sn (99.97%) and Sn-Ag unleaded binary solder alloys at different Ag concentrations 0.5% Ag, 1.5% Ag, 3.5% Ag, and 6% Ag were calculated. Surface and interface calculations were based on the contact angle values which are obtained using the drop method. For this purpose, the alloys were prepared and Cu (99.85%) was chosen as substrate material. The contact angles (θ) were measured using the recorded pictures of these drops. The graphics of the measured contact angles at each concentration were drawn as a function of temperature. An empirical relation, which gives the experimentally measured contact angle values, was obtained by fitting process. The surface tension of liquid alloy drop (γ_{LV}) and interface tension between copper substrate and liquid drop (γ_{SL}) were calculated using these angle values. The relation; $\gamma_{SV} - \gamma_{SL} = \gamma_{LV} \cos\theta$ (Young-Dupre) was used in calculations. As a conclusion, the temperature and Ag-Sn concentration dependency of surface and interface tensions were investigated.



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