

Wetting Properties of Silver Based Alloys

Authors : Zoltán Weltsch, József Hlinka, Eszter Kókai

Abstract : The temperature dependence of wettability (wetting angle, Θ (T)) for Ag-based melts on graphite and Al₂O₃ substrates is compared. Typical alloying effects are found, as the Ag host metal is gradually replaced by various metallic elements. The essence of alloying lies in the change of the electron/atom (e/a) ratio. This ratio is also manifested in the shift of wetting angles on the same substrate. Nevertheless, the effects are partially smeared by other (metallurgical) factors, like the interaction between the oxygen-alloying elements and by the graphite substrate-oxygen interaction. In contrast, such effects are not pronounced in the case of Al₂O₃ substrates. As a consequence, Θ (T) exhibits an opposite trend in the case of two substrates. Crossovers of the Θ (T) curves were often found. The positions of crossovers depend on the chemical character and concentration of solute atoms. Segregation and epitaxial texture formation after solidification were also observed in certain alloy drops, especially in high concentration range. This phenomenon is not yet explained in every detail.

Keywords : contact angle, graphite, silver, soldering, solid solubility, substrate, temperature dependence, wetting

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