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Wettability and interfacial structure of Cu-aSn-bCr alloys on typical carbon material surfaces

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The non-wettability of the copper/carbon (Cu/C) interface prepares Cu/C composites by liquid-phase infiltration a complicated, energy-consuming, and costly process. The simultaneous addition of the active element chromium (Cr) and the low melting point alloying element tin (Sn) not only reduces the melting point of the alloy (Cu-aSn-bCr) but also improves the wettability and bond strength of the interface. This paper investigated the wettability and interfacial microstructure of this alloy system on the surface of carbon material from the changes in alloy concentration, temperature, and carbon materials, respectively. The results indicate that the changes in temperature, alloy concentrations, and carbon materials primarily affect the interface structure, spreading kinetics, and wetting mechanisms by influencing the reactivity of the interface, the composition, and distribution of reaction products (CrxCy); moreover, the alloy concentrations also affect the distribution form (solid solution, precipitation phases, segregation) of alloying elements to impact the interface structure.

Keywords: carbon, wetting, interface, microstructure, reaction, spreading