

New directions in phase-field modeling for multi-component and multi-phase systems

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It has been shown extensively that the phase-field technique is capable of dealing in a phenomenological, and more and more also quantitative, way with the complex processes and morphologies involved in microstructure evolution in polycrystalline, multi-component and multi-phase systems. To obtain realistic input information on the bulk and interfacial properties for all phases present in the system, the phase-field technique is often combined with other modeling techniques, such as the CALPHAD method, first principles based calculations and molecular dynamics simulations.

In this presentation, different methodologies are explained to couple the phase-field technique with some of the CALPHAD models. As illustration, the combined methodology is applied to simulate diffusion controlled phase transitions in the Ag-Cu-Sn system used in leadfree soldering. Furthermore, some of the remaining incompatibilities between both approach and the ongoing efforts to solve them are discussed.