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Particle capture in binary solidification JUSTIN KAO, Massachusetts Institute of Technology, ALEXANDER GOLOVIN, STEPHEN DAVIS, Northwestern University — We investigate the interaction of a spherical foreign particle and a propagating solidification front in a binary alloy: depending on material properties and the speed of the front, the particle may either be captured in the solid phase, or rejected and pushed ahead of the front. We employ numerical boundary integral and continuation methods to compute the critical speed for particle capture, and its scaling dependence on the system parameters. Our results reconcile differing predictions of previous theoretical works, and show that many typical systems may obey a new, intermediate, regime of the critical speed. We observe that the presence of solute *decreases particle speeds* by an order of magnitude below those for a single-component system, but *increases bubble speeds* as compared to the single-component system.

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