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Interplay between diffusive and displacive transformations: A Phase-Field approach RAJEEV AHLUWALIA, MATHIEU BOUVILLE, Institute of Materials Research and Engineering, IMRE — The phase-field method has been extensively used to study martensitic (displacive) transformations. However they have been studied "in isolation." We study the competition between the diffusionless martensitic transformation and a diffusive phase transition which involves phase separation. Phase separation occurs if diffusivity is high enough whereas martensite will form only if little diffusion can occur. A complete description of martensite-forming materials should incorporate both difuusive as well as diffusionless modes of structural change. We use phase-field simulations to study the interplay between these diffusive and displacive phase transformations at different temperatures. TTT (temperature-time-transformation) diagrams can thus be obtained. We study the role of the temperature-dependence of diffusivity on the microstructure and TTT diagrams, by strengthening or weakening this dependence keeping other parameters unchanged.

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