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Phase-field simulations of martensite-martensite nanocomposites

MATHIEU BOUVILLE, RAJEEV AHLUWALIA, Institute of Materials Research and Engineering — We study composites made of two martensite-forming materials, with different transition temperatures, $T_l < T_h$. The system remains austenitic at high temperature, and if the temperature is very low then the difference between the two materials is negligible. We therefore focus on intermediate temperatures, i.e. $T_l \leq T < T_h$. Then only one material can transform to martensite — the other transformation may occur only if it is triggered by the martensite already formed (volume changes will then play a key role). We study the effect of reducing the size of the system, in particular how martensite can form in nanocomposites at temperatures at which no martensitic transformation can exist at the macroscopic scale. This work has relevance to multiferroics, where the phase transformation in one material (e.g. ferroelectric) triggers a transformation in another material, for instance magnetostrictive.

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