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Phase transformations coupled to deformation processes

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Phase transformation processes have a substantial impact on the inelastic and damage response of materials. Yet, our understanding of how different loading conditions affect volume fractions of transformed phases, microstructure and transformation pathways is very much in its infancy. With an emphasis on distilling single crystal physics that can, in principle, be incorporated into higher length scale models, I will discuss how recent atomistic simulations on Ti are beginning to provide insights into transformation pathways and the interplay of phase transformations and deformation processes. These simulations are complemented by shock experiments on Zr, Ti together with characterization studies at the Advanced Photon Source.