Title:

Atomic Scale to Mesoscale Understanding of Plasticity in Ordered Materials

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Abstract:

Intermetallic compounds have been of significant interest for decades due to their unique properties. These properties arise from the combination of metallic and covalent bonding between the constituent atoms. The strong bonding can lead to high melting temperatures which promise good high temperature properties and through alloying excellent oxidation resistance. In addition to structural applications, many functional properties such as ferromagnetism, magnetostriction, magnetocaloric properties, thermoelectric properties, shape memory effects, superconductivity and more are also intriguing.

While applications for intermetallics are broad and exciting, the realization of their use is lagging due to issues with plasticity such as damage tolerance and fabricability. Control of composition is critical to reliable performance. Additives has been effective in increasing ductility, but typically without an understanding of the cause. Atomic scale effects such as bonding, defect energies, and anti-phase domain boundaries, interact with mesoscale factors such as grain size and dislocation distributions. Computational modeling provides a new tool for finding viable solutions to increasing ductility. Papers are sought that present new developments in the understanding of the complex multi-scale interactions in ordered alloys and that could lead to improved plasticity and applicability.