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Grain Boundaries From Theory To

Grain boundaries are a main feature of crystalline materials. They play a key role in determining the properties of materials, especially when grain size decreases and even more so with the current improvements of processing tools and methods that allow us to control various elements in a polycrystal.

Grain Boundaries - From Theory to Engineering | Louise ...

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Grain boundaries : from theory to engineering

The theory of grain boundary (the interface between crystallites, GB) structure has a long history 1 and the concept of GBs undergoing phase transformations was proposed 50 years ago 2,3.

Observations of grain-boundary phase transformations in an ...

grains are joined at a specified misorientation angle and the energy of the grain boundary is determined by summing the interaction energies of each atom with all others. This summation is carried over atoms in the grain boundary, i.e., those whose positions are not part of the adjacent perfect crystal

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structure.

Chapter 8 Grains and Grain Boundaries

The continuum mechanics of single crystals is well understood away from grain boundaries, at least within a conventional framework. What seems missing is an associated theory of grain boundaries that accounts for (i) the slip-rates $\dot{\gamma}^{\alpha}$, $\alpha = 1, 2, \dots, N$, on the individual slip systems at the grain boundary; (ii)

A theory of grain boundaries that accounts automatically

...

A grain boundary is the interface between two grains, or crystallites, in a polycrystalline material. Grain boundaries are 2D defects in the crystal structure, and tend to decrease the electrical and thermal conductivity of the material. Most grain boundaries are preferred sites for the onset of corrosion and for the precipitation of new phases from the solid. They are also important to many of the mechanisms of creep. On the other hand, grain boundaries disrupt the motion of dislocations through

Grain boundary - Wikipedia

Grain Boundaries in Metals. Abstract. ACCORDING to the transition lattice theory, since in pure metals and single-phase alloys the only difference between the two grains which meet at a boundary is one of direction, the atoms at the boundary take up positions representing a compromise between the two crystal lattice directions.

Grain Boundaries in Metals | Nature

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methods that allow us to control various elements in a polycrystal.

Grain Boundaries - springer

Theory. In grain-boundary strengthening, the grain boundaries act as pinning points impeding further dislocation propagation. Since the lattice structure of adjacent grains differs in orientation, it requires more energy for a dislocation to change directions and move into the adjacent grain.

Grain boundary strengthening - Wikipedia

The properties of metals change depending on the composition and structure of grain boundaries in polycrystalline materials. Yu et al. discovered a surprising grain boundary superstructure in a nickel-bismuth alloy. Previously, the structure was only known to exist in a specific type of uncommon grain boundary, and experiments had focused on bicrystals. Unexpectedly, this alloy has grain ...

Segregation-induced ordered superstructures at general

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Grain Boundaries: From Theory to Engineering (Springer Series in Materials Science) By Louissette Priester Grain boundaries are a main feature of crystalline materials. They play a key role in determining the properties of materials, especially when grain size decreases and even more so with the current

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When grain boundary sliding is obstructed by an unfavourably orientated grain, the resultant stress concentration may be relaxed by dislocation motion in the blocking grain. These

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dislocations pile up against the opposite grain boundary until the back stress prevents further activation of the source and stops sliding.

Grain Boundary Sliding - an overview | ScienceDirect Topics

Grain boundary

Grain Boundary

Grain boundaries are defects in the crystal structure, and tend to decrease the electrical and thermal conductivity of the material. A grain boundary is a general planar defect that separates regions of different crystalline orientation (such as grains) within a polycrystalline solid.

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