

Defects in crystalline solids

Crane, Russak - 12.4: Defects in Crystals

Paper defects

Crystal defects

Crystalline solids have a very regular atomic structure: that is, the local positions of atoms with respect to each other are repeated at the atomic scale. These arrangements are called perfect crystal structures. However, since 99% all crystalline materials are not perfect, the regular pattern of atomic arrangement is interrupted by crystal defects. The defect types are classified according to their dimension:

- Point defects
- Line defects
- Planar defects
- Bulk defects

Importance of defects: Defects determine many properties of materials (these properties that we call "structure sensitive properties"). Even properties like the specific resistance of semiconductors, conductance in bulk crystals or diffusion properties in general which may appear as intrinsic properties of a material are defect dominated - in case of doubt by the intrinsic defects. Few properties - e.g. the melting point or the elastic modulus - are not, or only weakly influenced by defects.

Description: -

- Crystals -- Defects.

Solids.Defects in crystalline solids

- The Structures and properties of solids, 1Defects in crystalline solids

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Crystal Defects

Several post-transition metals also have low melting points, whereas the transition metals melt at temperatures above 1000 °C. Because a crystal must be electrically neutral, any defect that affects the number or charge of the cations must be compensated by a corresponding defect in the number or charge of the anions. Metal Deficiency Defect In this defect, some cations are missing from the lattice site and for maintaining its electrical neutrality another remaining cation increase their valency.

Line defect

We don't offer credit or certification for using OCW. An example of this phenomenon, called a A defect in an ionic lattice that occurs when one of the ions is in the wrong position. The boundary atoms in two randomly oriented grains, therefore, cannot have a perfect complement of the surrounding atoms.

Crystal Imperfections

They have the main effects on the crystal properties. Summarising: Microscopic defects can occur in crystals, amorphous solids and polymers.

12.4: The Fundamental Types of Crystalline Solids

Frenkel defect are not found in pure alkali metal halides because the cations due to larger size cannot get into the interstitial sites. Assuming that all of the cation sites are fully occupied, what is the stoichiometry of the sample? Sodium-sulfur batteries use a solid Al₂O₃ electrolyte with small amounts of solid Na₂O. In ...property owing to imperfections called dislocations within their crystal lattices.

Crystal Defects

A familiar example of an edge dislocation occurs when an ear of corn contains an extra row of kernels between the other rows.

Defects in Crystals

Also, it is usually cations that cause this defect since they can easily fit in the interstitial site due to their small and compact size. The formation of the former depends upon the electronic structure of the impurity while that of the latter on the size of the impurity. Send to friends and colleagues.

10.5 The Solid State of Matter

Substituting two K^+ ions for two Ca^{2+} ions will decrease the total positive charge by two, and an oxide vacancy will maintain electrical neutrality. Substances consisting of larger, nonpolar molecules have larger attractive forces and melt at higher temperatures. Several types of defects are known, as illustrated in.

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