

Elements Of Material Science And Engineering Van Vlack

Annealing (materials science)

Progress in Materials Science. 113: 100675. doi:10.1016/j.pmatsci.2020.100675. Van Vlack, L. H. (1985). Elements of Materials Science and Engineering. Addison-Wesley

In metallurgy and materials science, annealing is a heat treatment that alters the physical and sometimes chemical properties of a material to increase its ductility and reduce its hardness, making it more workable. It involves heating a material above its recrystallization temperature, maintaining a suitable temperature for an appropriate amount of time and then cooling.

In annealing, atoms migrate in the crystal lattice and the number of dislocations decreases, leading to a change in ductility and hardness. As the material cools it recrystallizes. For many alloys, including carbon steel, the crystal grain size and phase composition, which ultimately determine the material properties, are dependent on the heating rate and cooling rate. Hot working or cold working after the annealing process...

Colloidal crystal

agriculture and robotics. Polycrystalline colloidal structures have been identified as the basic elements of submicrometre colloidal materials science. Molecular

A colloidal crystal is an ordered array of colloidal particles and fine grained materials analogous to a standard crystal whose repeating subunits are atoms or molecules. A natural example of this phenomenon can be found in the gem opal, where spheres of silica assume a close-packed locally periodic structure under moderate compression. Bulk properties of a colloidal crystal depend on composition, particle size, packing arrangement, and degree of regularity. Applications include photonics, materials processing, and the study of self-assembly and phase transitions.

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