The concentration of intrinsic defects can be exceedingly small in highly refractory ceramics of large defect formation energy. As a result, solutes and especially aliovalent solutes which are accompanied by the formation of extrinsic vacancies or interstitials have a great importance in determining overall defect behavior. Oxidation and reduction processes also cause point defects to be introduced, the concentrations of which can exceed that of the intrinsic ionic defects. Intrinsic defect concentrations increase with temperature, as discussed above. Crystal Point Defects are a major source of disorder in semiconductors, since they are thermodynamically favored to occur at finite concentrations and temperatures. From: Encyclopedia of Condensed Matter Physics, 2005. Related terms: This chapter covers the properties of vacancies and self-interstitials, their interaction with other lattice defects, the production mechanisms and their importance for radiation damage of materials. Properties of atomic solutes per se are of interest mainly with respect to thermodynamics of alloys which are treated in chs. This large lattice perturbation and the related dynamic and static properties play a key role in the evolution of typical damage structures. These involve not only the microstructure but also the microchemistry of alloys. Point defects: How are they different from those in metals? Impurities: How are they accommodated in the lattice and how do they affect properties? Mechanical Properties: What special provisions/tests are made for ceramic materials? CERAMICS: DEFINITIONS: The technical definition of ceramics involves a much greater variety of products than is normally realized. To most people, the word ceramics means dinnerware, figurines, vases, and other objects of ceramic art. The majority of ceramic products not generally recognized. Examples are bathtubs, washbowls, sinks, electrical insulating devices, water and sewerage pipes, bricks, hollow tile, glazed building tile, floor and wall tile, earthenware, porcelain enamel and glass. Related terms: This chapter covers the properties of vacancies and self-interstitials, their interaction with other lattice defects, the production mechanisms and their importance for radiation damage of materials. Properties of atomic solutes per se are of interest mainly with respect to thermodynamics of alloys which are treated in chs. This large lattice perturbation and the related dynamic and static properties play a key role in the evolution of typical damage structures. These involve not only the microstructure but also the microchemistry of alloys. Point defects: How are they different from those in metals? Impurities: How are they accommodated in the lattice and how do they affect properties? Mechanical Properties: What special provisions/tests are made for ceramic materials? 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(1991) Properties and interactions of atomic defects in metals and alloys Archived 2013-02-03 at Archive.today, volume 25 of Landolt-Börnstein, New Series III, chapter 2, p. 88, Springer, Berlin. Siegel, R. W. (1982) Atomic Defects and Diffusion in Metals, in Point Defects and Defect Interactions in Metals, J.-I. Takamura (ED.), p. 783, North Holland, Amsterdam. Crawford, J. H.; Slifkin, L. M., eds. (1975). Point Defects in Solids. Point defects and their reactions in electron-irradiated GaAs investigated by optical absorption spectroscopy”, Physical Review B. 54 (12): 8527â€“8539. Bibcode:1996PhRvB..54.8527H. doi:10.1103/PhysRevB.54.8527. The role of self-interstitial atoms on the high temperature properties of metals”. Phys. Rev. 11 Point Defects, Charge, and Diffusion CHAPTER PREVIEW Point defects are particularly important in ceramics because of the role they can play in determining the properties of a material. The entire semiconductor industry is possible because of minute concentrations of point defects that are added to Si: the dopants determine if the Si is n-type, p-type or semi-insulating; they determine the electrical properties. Solid-oxide fuel cells work because of the large concentrations of oxygen vacancies present: the vacancies provide fast ion conduction pathways. Cubic zirconia (CZ) is cubic because...