MT209 Aug 3:0

Defects in materials

Instructor

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Department: Materials Engineering

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

The course provides a broad overview of defects in crystalline solids, their effect on properties, and methods of characterizing them.The emphasis of the course is on thermodynamics of defects and defect-interactions and properties which emerge from the movement of defects. The course is appropriate for 1st/2nd year Master's and PhD students, 3rd and 4th year UG students, 5th year BS-MS students

Prerequisites

none

Syllabus

Thermodynamics of point defects (vacancies and interstitials) in metals, defect chemistry, diffusion, electronic properties, geometrical aspects of dislocations, Volterra and atomistic models, stress fields and energy of dislocations, forces on dislocations, dislocation motion and slip, stacking faults and APBs, dislocations in FCC and BCC metals, thermodynamics of interfaces, Gibbs-Thompson effect, segregation, anisotropy of surface energy, equilibrium shape of crystals, geometry of grain boundaries, high and low angle boundaries, speacial and general boundaries, effect of gran boundary character on properties.

Course outcomes

Thermodynamics and kinetics of crystal defects, and their central role on properites of materials

Grading policy

25% for five short quizzes, 25% for two midterms, 15% for term paper, 35% for final exam.

Assignments

Resources