Summary

Macrosopic properties of solids are addressed using symmetry arguments, tensors, thermodynamics, and simple phenomenological models.

Content

1. The tools of phenomenological descriptions: symmetry, tensors, and thermodynamics
2. Description of static equilibrium properties: dielectric response, elasticity, piezoelectricity, pyroelectricity and thermal dilatation
3. Description of dynamic equilibrium properties and transport properties: dielectric relaxation, sound propagation, electrical conductivity, heart conductivity, and thermoelectric phenomena
4. Light propagation in anisotropic materials
5. Landau theory of structural phase transitions

Learning Prerequisites

Recommended courses
General physics

Learning Outcomes

By the end of the course, the student must be able to:

• Apply the symmetry arguments, tensors and thermodynamics for a description of the physical properties of materials.

Teaching methods

Ex cathedra and exercises

Assessment methods

Midterm test + oral exam during the exam session

Resources

Ressources en bibliothèque

• Physical properties of crystals / Nye
• Introduction to solid state physics / Kittel
Prerequisite for
Elecroceramic components