

# 17 Lecture - PHY101

## Important Subjective

**What is a materials science, and why is it important?**

**Answer:** Materials science is the study of the physical and chemical properties of materials. It is important because it forms the foundation of many technological advancements and enables the development of new materials that can withstand extreme conditions.

**What are the three main categories of materials, and what are their properties?**

**Answer:** The three main categories of materials are metals, ceramics, and polymers. Metals are known for their high electrical and thermal conductivity, good strength, and malleability. Ceramics are hard, brittle, and have high melting points, making them useful for high-temperature applications. Polymers are lightweight, flexible, and have good insulating properties.

**What is X-ray diffraction, and how is it used in materials science?**

**Answer:** X-ray diffraction is a technique used to study the structure of materials at the atomic and molecular level. It involves shining X-rays on a sample and observing how the X-rays scatter. By analyzing the scattering pattern, researchers can determine the atomic and molecular structure of the material.

**Why is the study of the mechanical properties of materials important?**

**Answer:** The study of the mechanical properties of materials is important for understanding how materials respond to forces such as stress and strain. This knowledge is critical for the development of new materials that can withstand extreme conditions.

**What are the key thermal properties of materials, and why are they important?**

**Answer:** The key thermal properties of materials are thermal conductivity, specific heat, and thermal expansion. These properties are important for the development of materials that can withstand high temperatures and are used in high-temperature applications.

**What are the key electrical properties of materials, and why are they important?**

**Answer:** The key electrical properties of materials are conductivity, resistivity, and dielectric constant. These properties are important for the development of materials used in electronic devices.

**What is the role of polymers in materials science?**

**Answer:** Polymers are a class of materials that are lightweight, flexible, and have good insulating properties. They are used in a variety of applications, including packaging, textiles, and medical devices.

**What is the role of ceramics in materials science?**

**Answer:** Ceramics are a class of materials that are hard, brittle, and have high melting points, making them useful for high-temperature applications. They are used in a variety of applications, including aerospace and defense.

**What is the role of metals in materials science?**

**Answer:** Metals are a class of materials that have high electrical and thermal conductivity, good strength, and are malleable and ductile. They are used in a variety of applications, including construction and transportation.

**What are the key optical properties of materials, and why are they important?**

**Answer:** The key optical properties of materials are refractive index, absorption, and reflection. These properties are important for the development of materials used in optical devices such as lenses and mirrors.