

Subject : ENGINEERING PHYSICS

Department : Civil Engineering

Question : Discuss the various properties of metallic glasses?

ANS:

Properties of Metallic Glasses:

Metallic glasses, also known as amorphous metals, are metallic alloys that have a disordered atomic structure rather than the regular crystalline lattice found in traditional metals. This unique structure gives metallic glasses a range of distinctive properties that differ from those of crystalline metals. Here's an overview of the various properties of metallic glasses:

1. Atomic Structure

Amorphous Structure: Unlike crystalline metals, metallic glasses have an amorphous, non-crystalline structure where atoms are arranged randomly. This lack of long range order leads to different physical properties compared to crystalline materials.

2. Mechanical Properties

High Strength: Metallic glasses typically exhibit high tensile strength and hardness. The absence of dislocations (defects in the atomic lattice) in their structure allows them to withstand higher stresses compared to crystalline metals.

Elasticity: They generally have high elastic limits and can deform elastically under stress without permanent deformation, contributing to their high strength-to-weight ratio.

Brittleness: While metallic glasses are strong, they can be brittle, especially under certain conditions. They often lack the ductility of crystalline metals, making them prone to sudden failure under stress.

3. Thermal Properties