

METALLIC GLASSES

Metallic glasses are amorphous alloys with an atomic configuration similar to that of molten liquid. Generally a glass is an amorphous, brittle, transparent solid and the metals are malleable, ductile and exhibit crystalline properties. But the metallic glasses share the properties of both glasses and metals.

Properties

1. They possess high strength and good magnetic properties.
2. They are hard and corrosion resistant.
3. They are ductile, malleable, opaque and brittle.
4. They have low coercivity and hysteresis loss.

Preparation

Metallic glasses are prepared by the technique known as Splat cooling. In this method; the alloys are rapidly quenched suddenly cooled at the rate of 10^6 K per second. Then they are fed through high conducting rollers of great mass which is rotating at high speeds. Due to rolling we get the metallic glasses in the shape of a ribbon.

Types

- (1) metal –metalloid glasses

They are made from metals (Fe, Ni, Co) and metalloids (B, Si, C, P)

(2) metal- metal glasses

They are made from Nickel-niobium, magnesium-zinc, copper- zirconium etc

Applications

1. They are similar to the soft magnetic alloys, so they are used in leads of tape recorder, cores of transformers and magnetic shields.
2. Since they are very strong they are useful in concrete, plastic and for reinforcement of vessels.
3. Since they are malleable and ductile, they are used to make different types of springs.

Because of their high resistivity, they are used to make computer memories, magneto-resistance sensors etc.

4. Since they have high corrosion resistance, they are used in reactor vessels, surgical clips, marine cables etc.
5. They are used in the production of high magnetic fields, because some metallic glasses can behave as super conductors.

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