



# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107



## AN AUTONOMOUS INSTITUTION

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

### Unit – V New Engineering Materials

#### Topic: 6 Metallic Glasses Preparation

##### PREPARATION OF METALLIC GLASSES

###### Principle

Quenching is a technique used to form metallic glasses. Quenching means rapid cooling. Atoms move freely in the liquid state. When the liquid is quenched (rapidly cooled) it results in an irregular pattern, which results in the formation of metallic glasses.

###### Technique

The process involved in the formation of metallic glasses is melt spinning technique.

##### MELT SPINNING TECHNIQUE

###### Experimental setup

The setup consists of a refractory tube with fine nozzle at the bottom. The refractory tube is placed over the rotating roller made up of copper. An induction heater is wound over the refractory tube in order to heat the alloy inside the refractory tube.

###### Preparation

The alloy is put into the refractory tube and the induction heater is switched ON. This heats the alloy and hence the molten alloy is ejected through the nozzle of the refractory tube onto the rotating roller and is made to cool suddenly. The ejection rate may be increased by increasing the gas pressure inside the refractory tube. Thus due to rapid quenching a glassy alloy ribbon called metallic glass is formed over the rotating roller. Hence this technique is used to develop materials that require extremely high cooling rates in order to form metallic glasses. The cooling rates achievable by melt-spinning method are in the order of  $10^4$ – $10^7$  Kelvin per second.

