



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

SOLIDIFICATION

Solidification of pure metals and alloys

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Solidification of pure metals

- Chilling starts next to mold wall, skin is formed.
- Thickness of skin frozen varies with square root of time elapsed.
- In case of heterogeneous nucleation, presence of foreign particles alter the liquid solid interface energy enough to assist in nucleation, thereby reducing the amount of supercooling required to effect nucleation.

- Growth is in a direction opposite to the direction of heat flow. It is also dependent on crystallographic directions.
- Next to the fine equiaxed grains on the wall, a zone of columnar grains is created and extends to the center of the casting.
- In alloys, however, growth of the columnar grain may be interrupted by an equi-axed grain growth.

Solidification of alloys

- In case of alloys, freezing occurs over a range of temperature.
- In such systems, generally the precipitating solid differs in composition from the liquid, due to which a concentration gradient is set up in the liquid.
- This concentration gradient results into supercooling of liquid ahead of the advancing front, known as constitutional supercooling and resultant structure is dendritic.

THANKS

