Defect formation during crystal growth from melt and selected epitaxial processes

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1. Overview, melt structure and point defect formation
2. Dislocation background and definitions
3. Dislocation dynamics
4. Grain boundaries, faceting and twinning
5. Second-phase particles

Overview, melt structure and point defect formation

1. Defect classification and thermodynamics
2. Contribution of the melt structure
3. Native point defect generation and non-stoichiometry
4. Extrinsic point defect incorporation and segregation
5. Constitutional supercooling and morphological instability

Dislocation background and definitions

1. Dislocation types –
   growth- and post-growth dislocations
2. Dislocation core and
   elastic properties of dislocations
3. Interaction with point defects
4. Misfit and threading dislocations
5. Dislocation movement and multiplication
6. Thermoelastic stress – classic modeling

Dislocation dynamics

1. Introduction – an overview of the DD
2. Dislocation motion and velocity
3. Long and short range reactions
4. Screeening effect and annihilation
5. Dislocation cell patterning and clustering
6. Modeling of cell structur formation
7. Dislocation engineering

Grain boundaries, faceting and twinning

1. Introduction – crystallographic basics
2. Dynamical polygonization – low-angle grain boundaries
3. Large-angle grain boundaries – polycrystallinity
4. Grain dynamics and ripening
5. Facetting and meniscus stability
6. Classification and generation of twins

Second-phase particles

1. Introduction – precipitates and inclusions
2. Precipitates – a cooling down phenomena
3. Inclusion incorporation and repulsion at melt and solution growth
4. Structural consequences – misfit and dislocation formation
5. 3D defect engineering