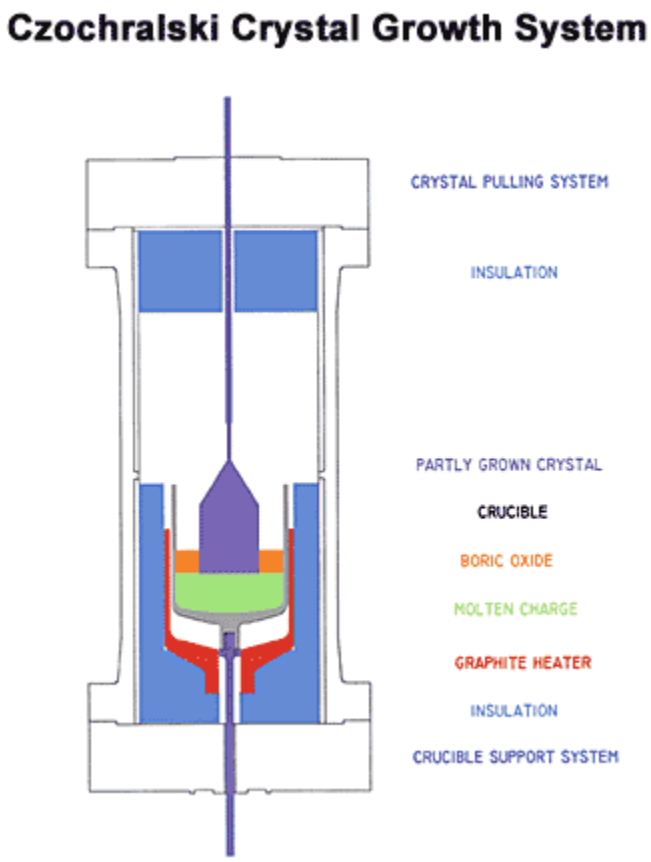
LEC Method (Liquid Encapsulated Czochralski)

The starting materials (either pre-synthesised polycrystalline chunks or, in the case of semi-insulating GaAs, elemental Ga and As) are placed in the growth crucible along with a pellet of boron trioxide. The crucible is placed inside a high pressure crystal puller and heated up.

At 460°C the boron trioxide melts to form a thick, viscous liquid which coats the entire melt, including the crucible (hence, liquid encapsulated). This layer, in combination with the pressure in the crystal puller, prevents sublimation of the volatile group V element.

The temperature is increased until the compound synthesises (temperatures and pressures are varied depending on which material is being produced). A seed crystal is then dipped, through the boron trioxide layer, into the melt. The seed is rotated and slowly withdrawn and a single crystal propagates from the seed.

Crystal growth is monitored by the use of CCTV cameras and measurements of weights, temperatures and pressures are made at regular intervals.