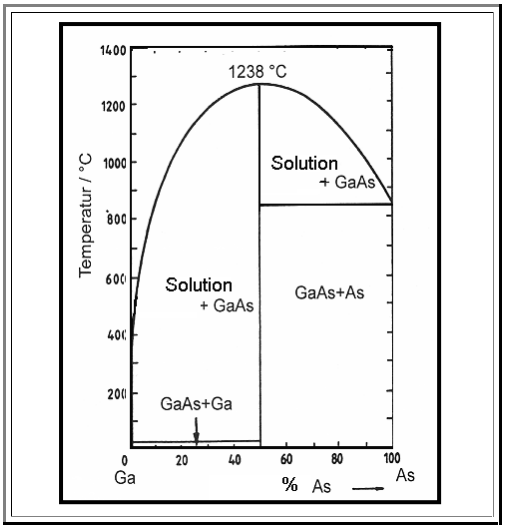
9.2 Bulk Crystals

9.2.1 GaAs

Basic Properties

- Producing **GaAs** crystals must starts with a consideration of its phase diagram.
  - Here it is. It is already sufficient to show that there is only a very small region where you can get solid and stoichiometric GaAs, essentially a line. Small deviations to the left or right will produce some liquid encasements - right after solidification and sone Ga or As related defects after complete solidification.



  - If you think you could avoid or a least minimize those defects (that cannot possibly be good for a device) by melting a perfect 50 : 50 mix of Ga and As, you must think again. Ga will start to evaporate out of your mix as soon as it melts, changing the compositions. and son on.....
- The message should be clear: It is far more difficult to produce a defect-free **GaAs** crystal than it is possible for **Si**. It is actually impossible. And that is true for all compound semiconductors.
  - The problems with III-V technology start right here!

--- To be continued (or possibly not) ---