## 3.4.4 Summary to: 3.4 Structure, Interface and Some Properties

Epitaxial layers are crucial for semiconductor technology.

- Misfit of lattice constants will produce strained layers upon epitaxial growth; strain relief happens by the formation of misfit dislocations.
- Misfit dislocatipons must be avoided at all costs!
- Below a usually rather small critical thickness d<sub>crit</sub> of the the thin layer no misfit dislocations will occur.
- Rule of thumb: 0.5 % misfit ⇒ d<sub>crit</sub> ≈10 nm
- The internal structure of thin films can be anything known from bulk materials plus some (important!) specialities.



**a-Si**: Micro electronics **a-Si:H**: Solar cells, **LCD** displays μ**c-Si:H**: Solar cells

- Properties of thin films can be quite different from that of the bulk material
  - The reason can be differences in length scales.
  - Semiconductor technology relies to some extent on superior thin film properties



Much better in thin films

- Electrical break-down field strength of dielectrics.
- Critical current densities in conductors.

Semiconductor Technology - Script - Page 1