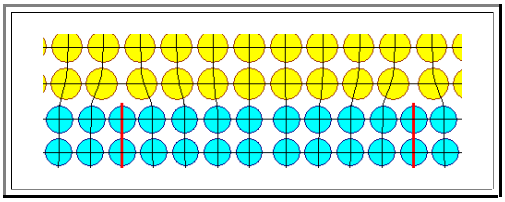
3.4.4 Summary to: 3.4 Structure, Interface and Some Properties

- 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_{crit} of the the thin layer no misfit dislocations will occur.
  - Rule of thumb:
    0.5 % misfit $\Rightarrow$ $d_{crit} \approx$ **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
µc-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.**

Exercise 3.4-1

All Questions to 3.4