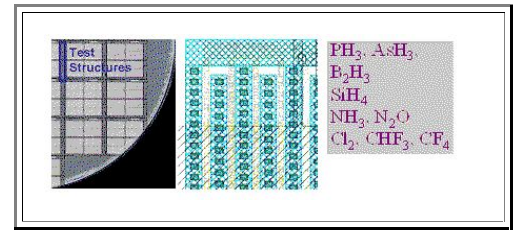


4.4 Summary

4.4.1 Summary to: 4. Getting Started

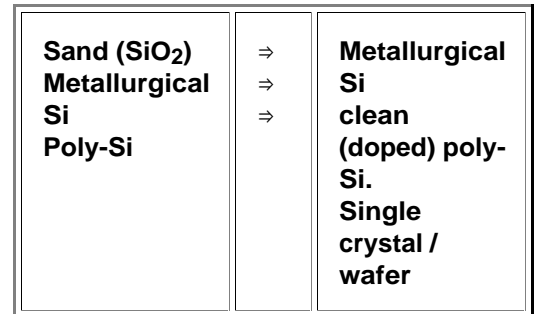
Semiconductor technology happens in factories. They need special materials, "reticles" (= structures), "know-how" and huge amount of money (= capital) as major inputs

- It's always about money! Only mass production will recover large investments.
- The materials side always contains semiconductor substrates ("wafers") and often very dangerous special "raw" materials.
- A number tells it all: **500 - 1.000** wafers /day are processed in a large **Si** "wafer fab"



Three big steps to **Si** wafers

- **Si** single crystal growth is done by "Czochralski process" (**CZ**).
- Dislocation-free crystals are possible but "bulk microdefects" and impurities cannot be totally avoided.
- Nearly perfect **300 mm** wafers are standard.



Growing single crystals of compound semiconductors is far more difficult than for elemental semiconductors

- Precise stoichiometry is important
- Vapor pressures of the constituents at the melting point might be very different
- New kinds of defects might be encountered
- Polytypie might be encountered

GaAs:
150 mm wafers, encapsulation technique, disl. density ($10^3 - 10^6$) cm^{-2}

GaP, InP
as **GaAs** but smaller and more expensive

SiC:
100 mm wafers, sublimation technique, several polytypes available, "pipe" defects

Major techniques are

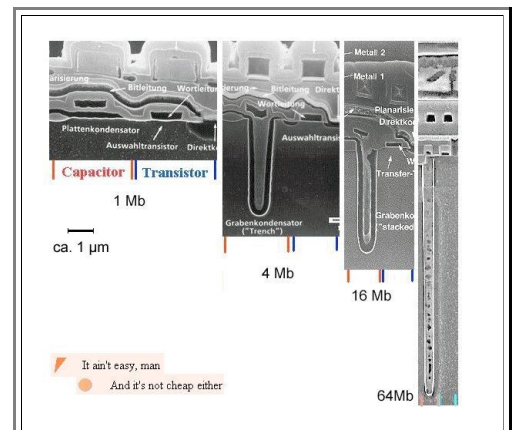
- Encapsulated **CZ**
- Sublimation growth

Exercise 4.4-1

All Questions to 4.

Questionnaire

Multiple Choice questions to 4.



It ain't easy, man
● And it's not cheap either