

6.3.4 Summary to: 6.3 Chemical Vapor Deposition

- Chemical Vapor Deposition (CVD) is simple in principle
 - Find to gases that react to the desired material at elevated temperatures
 - Put your wafer(s) into some machine, evacuate, heat to the desired temperature (preferably only the wafers) and admit the gases (and remove undesired reaction products).
 - There are many quite different technical ways (all of them expensive) to realize a **CVD** apparatus

Major **CVD** process are

Deposition of epitaxial **Si** layers - obviously always on (atomically clean) **Si** substrates. By admitting some gases carrying doping atoms (e.g. **AsH₃**, **AsH₃**) the layer can be doped in-situ.

Deposition of poly crystalline **Si** layers.

- Chemically similar to epitaxial layers, in reality quite different because the CVD reactors can be simpler.
- Poly-**Si** is needed for many uses: Gate electrode, interconnect, filling of holes, sacrificial layer.
- Its great advantage is its full compatibility with **Si** and **SiO₂**; its great disadvantage is its mediocre conductivity (for heavy doping).

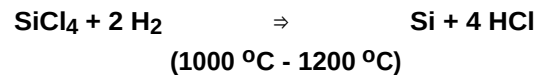
Deposition of **Si₃N₄**

- Very important. Always prone to produce mechanical stress (**Si₃N₄** is an unyielding ceramic!).

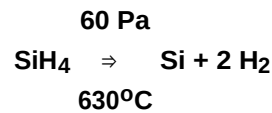
W (and Silicides, and ...)

- Not "good" processes, but sometimes unavoidable!

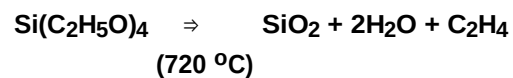
Epitaxial **Si** layer



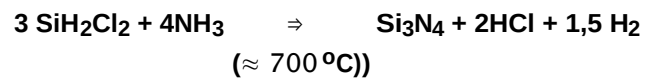
Polycrystalline **Si** layer



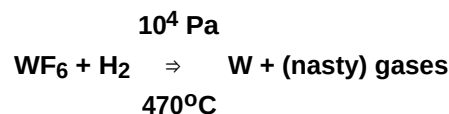
SiO₂ layer ("TEOS process")



Si₃N₄ layer



W layer



Questionnaire

Multiple Choice questions to all of 6.3