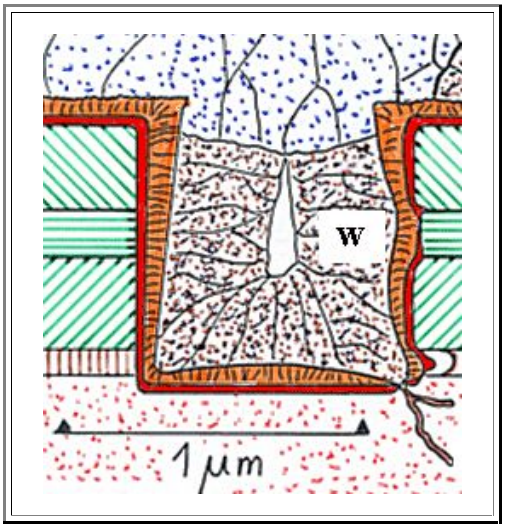
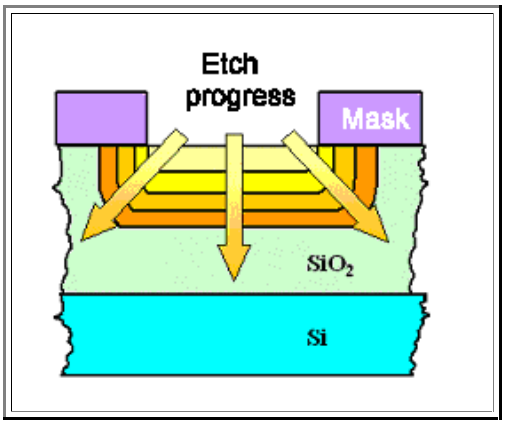
6.4.4 Summary to: 6.4 Etching Techniques

Structuring means selective removal of material (through a mask) by etching. There are three main conditions for etching:



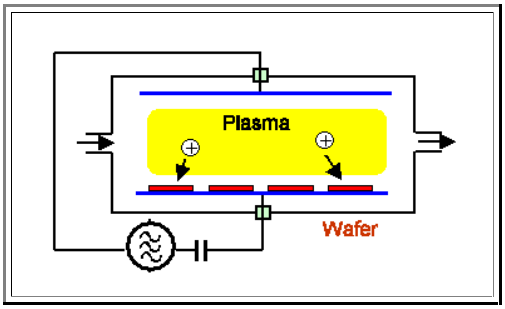
- **1.** Must attack material to be etched ⇒ *etching rate*.
- **2.** Must *not* attack everything else ⇒ *selectivity*.
- **3.** Must conserve structure of mask (good on left side of picture, not so good on right side).

Chemical etching:



- Can be near perfect for points **1.** and **2.**. Example: **HF** attacks only **SiO_2** but not **Si** and most other materials.
- Fails miserably on point **3.**
- Underetching is unavoidable. Can't be used for lateral structure sizes **< ≈ 2 µm**

Plasma etching ("Dry" etching)



- In a plasma quite unusual reactions can take place - including reactions never seen in normal chemistry. Many materials can be etched in a suitable plasma
- Etching might preserve the lateral mask dimensions - for reasons not always entirely clear
- There is tremendous potential in plasma etching because of the tremendously large parameter space - and tremendous problems and costs for the same reasons
- Allmost all "small" structures in semiconductor technology are obtained by plasma etching