1 Wet chemistry

1.1 Etch processes

In the fabrication of semiconductor microdevices various materials have to be etched. Either for removing an entire layer from the surface or to transfer a resist pattern into a layer beneath. Etch processes can be devided into wet and dry etching while there is a further separation into isotropic and anisotropic processes and also a separation in chemical and physical etch characteristics.

In an isotropic etch process the etching occurs in lateral and vertical direction. Thereby layers are removed not only in thickness but also in their circumference. In anisotropic processes the layer is only removed in vertical direction. Depending on the demands an isotropic process can be desired as well as an anisotropic.

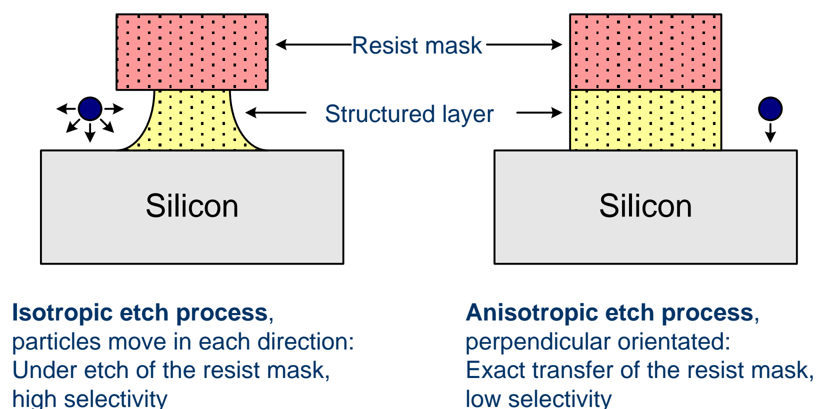

Fig. 1.1: Isotropic and anisotropic etch processes

An important value of etch processes is the selectivity. The selectivity is the ratio of abrasion of the layer which should be etched (e.g. an oxide film) and of the other layer (e.g. a resist mask). If the selectivity is 2:1 the oxide would be etched twice as fast as the resist.

Wet chemistry processes are not only applicable for etching but also for other needs:

- **wet etching:** removal of doped or undoped oxide layers from the entire wafer
- **wafer cleaning**
- **photoresist removal**
- **backside processing:** to remove layers which were deposited as a byproduct during other processes (e.g. thermal oxidation)
- **polymer removal:** to remove byproducts which occur during dry etching

The wet etching is only used very rare for structuring because of its (generally) isotropic etch profile. An exception are micromechanical devices. Due to the atomic structure of silicon crystals, well defined profiles with flank angles of 90° or 54.74° can be produced using wet chemistry.