Our Dry Etching Cluster consists of the Oxford RIE Plasmalab System 100 with ICP 380 source and the Oxford RIBE Ionfab 300. (RIE: Reactive Ion Etching, ICP: Inductively Coupled Plasma, RIBE: Reactive Ion Beam Etching). The Dry Etching Cluster is an advanced tool for micro- and nanomachining of various materials. The basic feature is a high frequency generator (RF) working at 13.56 Mhz, combined with a high vacuum chamber for wafers with a diameter of 4". The power varies in the range of 1-2500 W. Available process gases are SF6 and O2 for silicon etching; Cl2, He, Ar and O2 for chromium and other metals.

Contact
See KNMF website or contact the KNMF User Office.

Features
- Silicon etching via the cryo process (process temperatures are between -80 and -150 °C)
- Production of highly vertical, highly parallel and smooth sidewalls
- Critical lateral dimensions down to the range of 100 nm
- Aspect ratios (ARs) up to 6 are possible.
- Laser end point detection
- Metal etching via RIBE

Limitations/constraints
**Silicon:**
- Min. lateral dimensions: 100 nm
- Min. depth: 50 nm
- Max. aspect ratio at critical dimensions: 4
- Total max. depth: 40 µm

**Chromium:**
- Min. dimensions in lateral: 100 nm
- Selectivity over resist: 1:1
- Etch rate: 25…35 nm/min

Materials
- Mask material: PMMA, SiO2, ma-N 2401
- Structures on Si fragments or complete 4" Si wafers

Notice: Only silicon and chromium substrates can be processed reproducibly with standard processes at the moment.

Design rules
- Explicit and unambiguous layout according to the mentioned limitations.
- Markers for the better localization of the structures, e.g. in the SEM
- If the micro/nano structure is already written onto the substrate, the mask material has to be PMMA, SiO2 or ma-N 2401
- If combined with the KNMF e-beam, specific limitations concerning the e-beam design rules have to be considered

Typical structures and designs

Deep etched silicon gratings
Typical structures and designs (continued)

Silicon nanopillars with high aspect ratio

Freestanding cantilevers in silicon

Cantilever structures in chromium