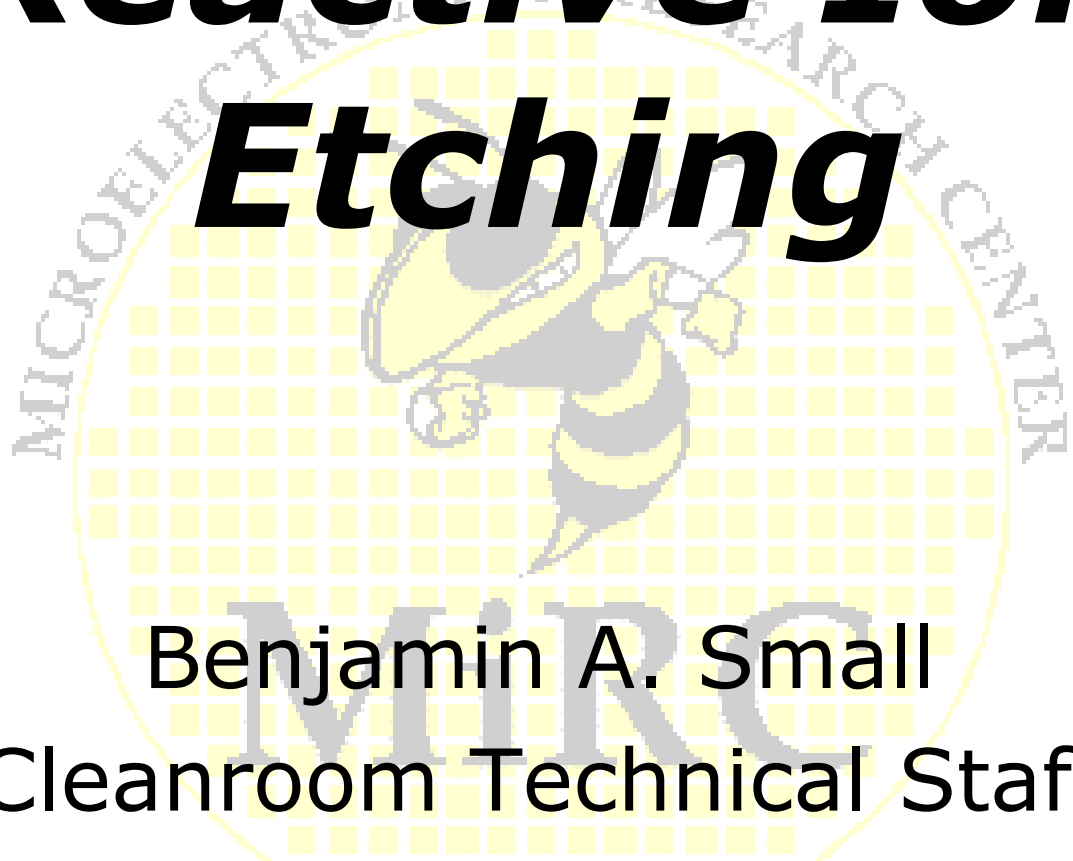


Reactive Ion Etching



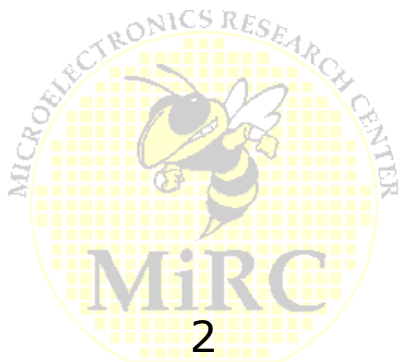
Benjamin A. Small
Cleanroom Technical Staff
January 23d, 2001

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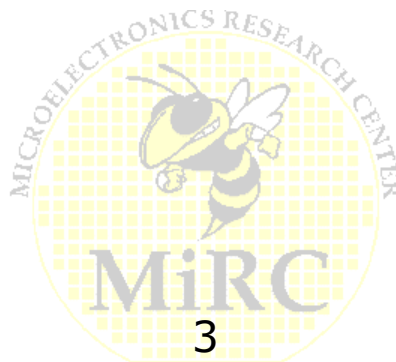
<http://grover.mirc.gatech.edu/processinfo/>

Gary's office

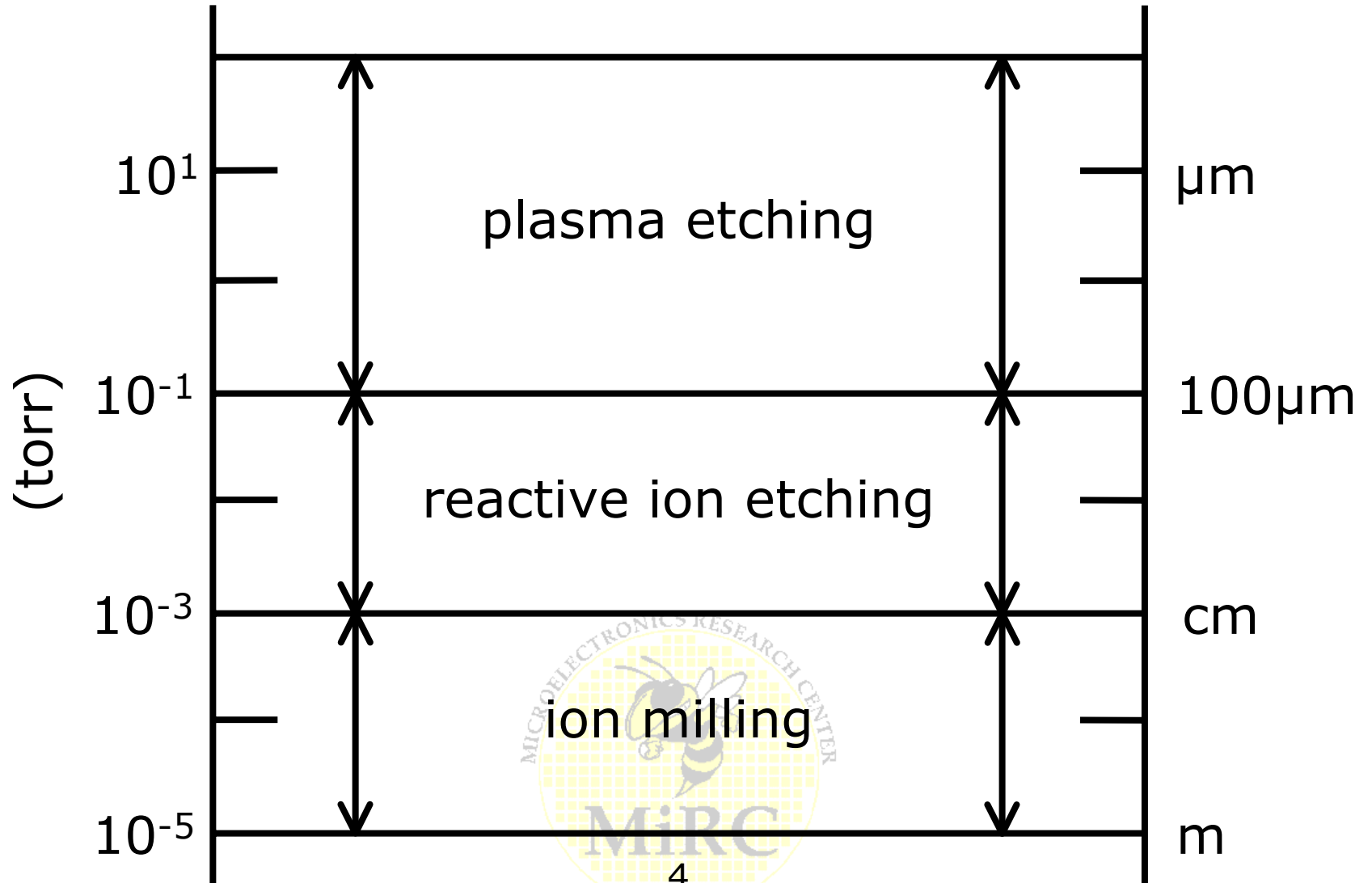


Outline

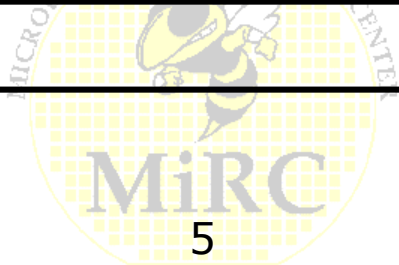
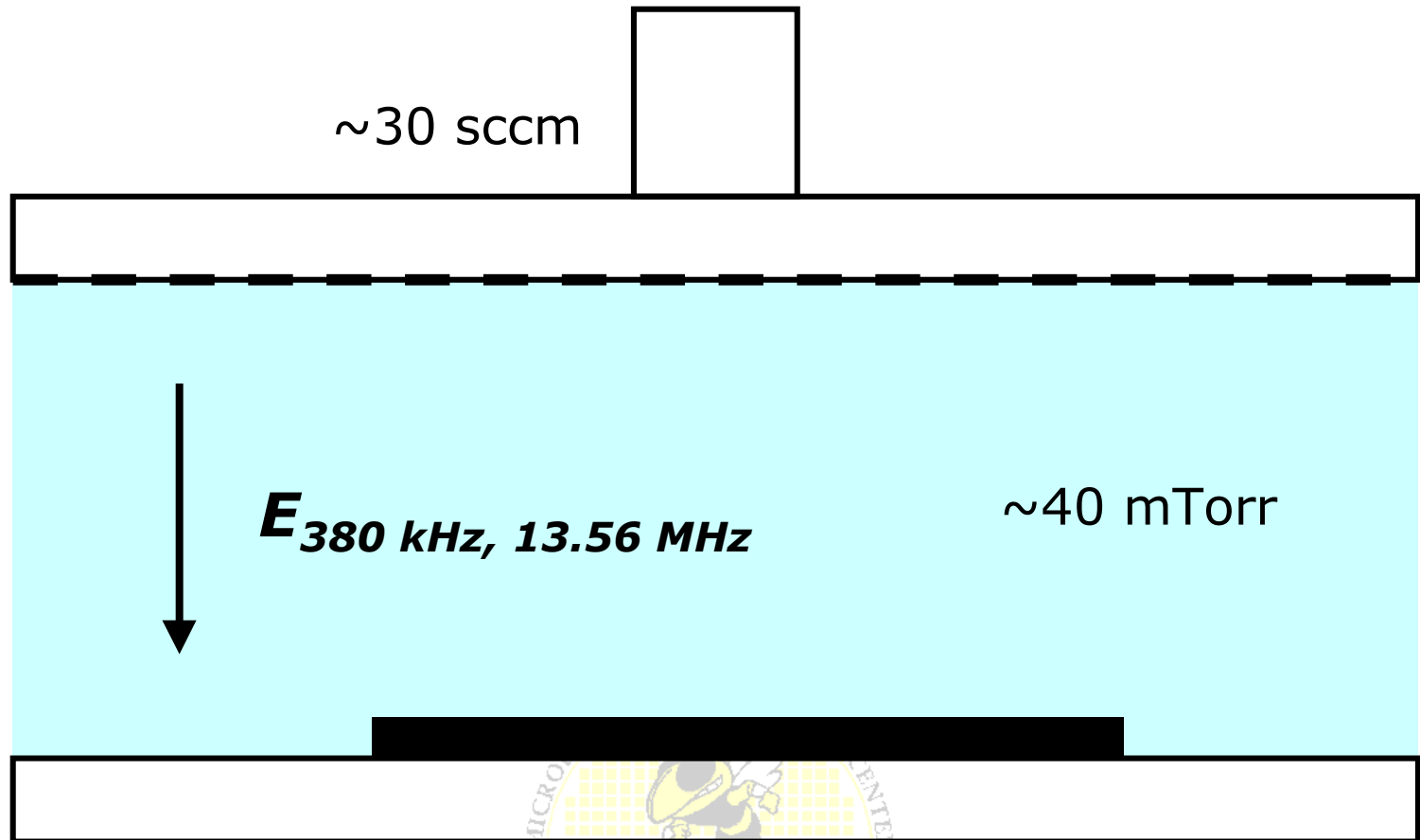
- Kinetics
- Mechanics
- Chemistry
- Equipment
- Suggestions



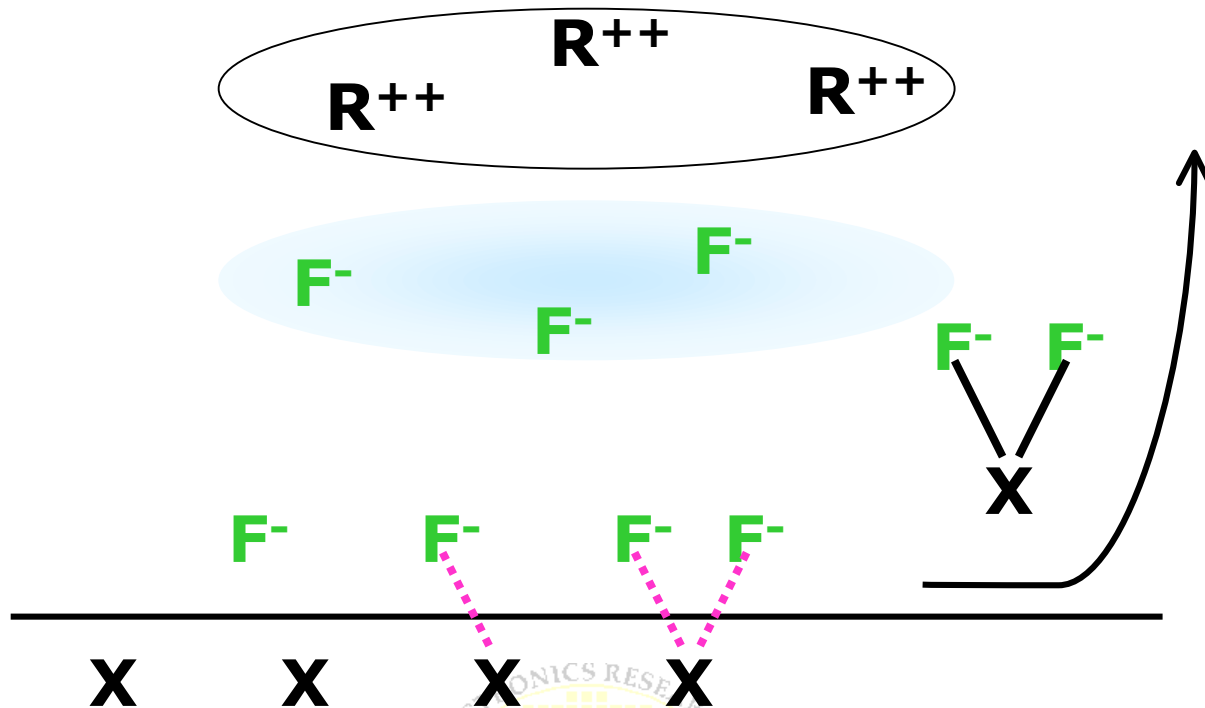
Kinetics



Mechanics



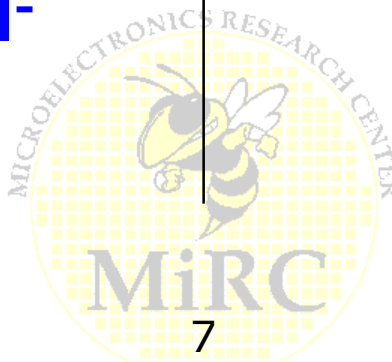
Chemistry



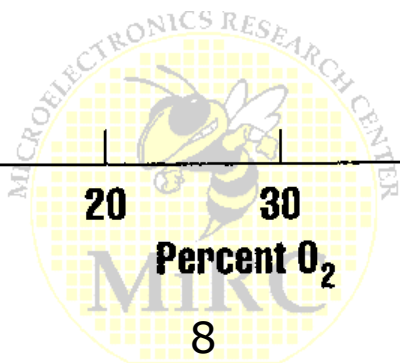
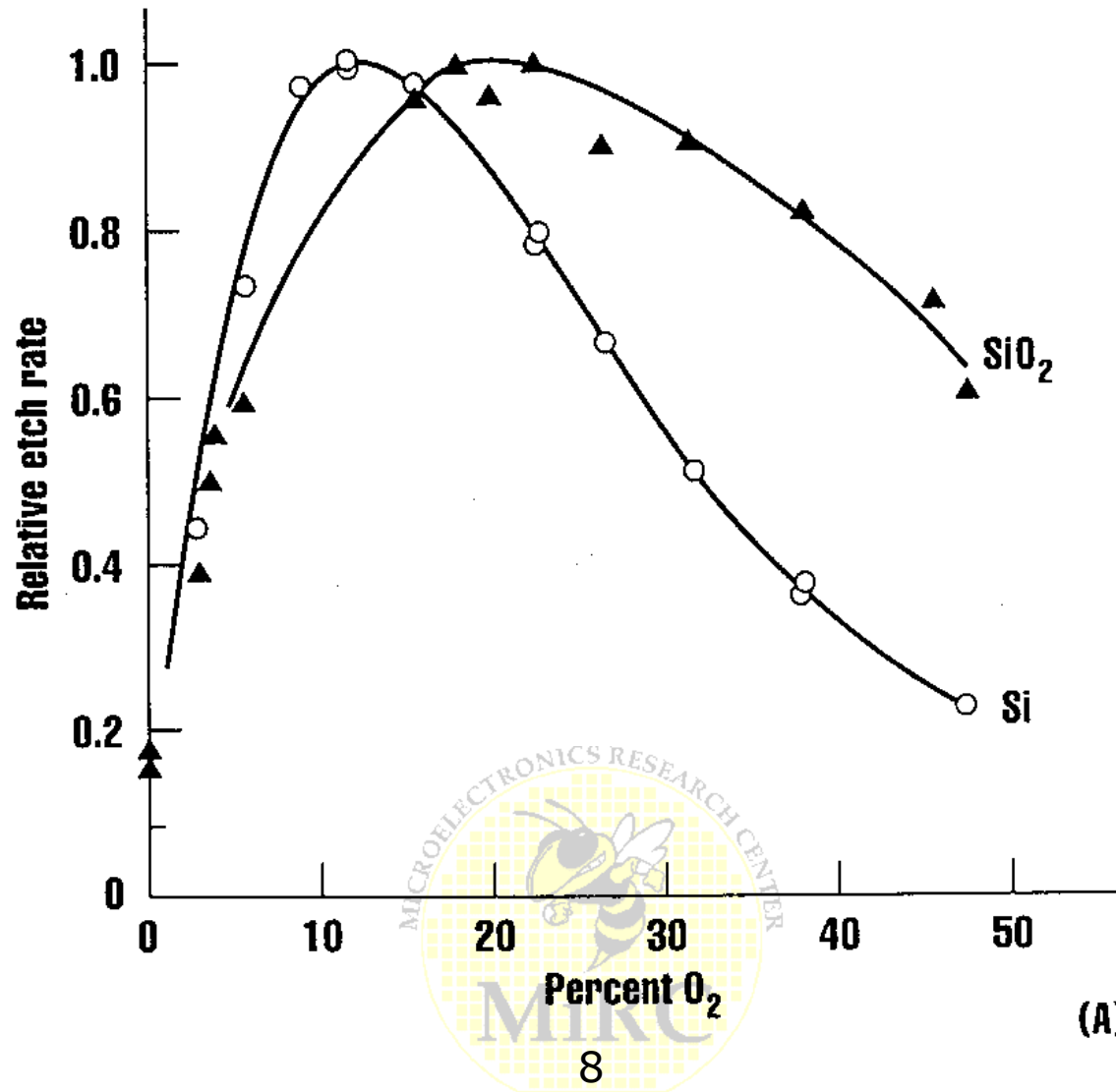
Chemistry

Silicon : F^- ; Cl^-
Oxide : F^-
Nitride : F^-
Organics : F^- / O_2
Aluminum : Cl^-
Silicides : F^-
III-V : Cl^- ; H_2
II-IV : H_2 ; Cl^-

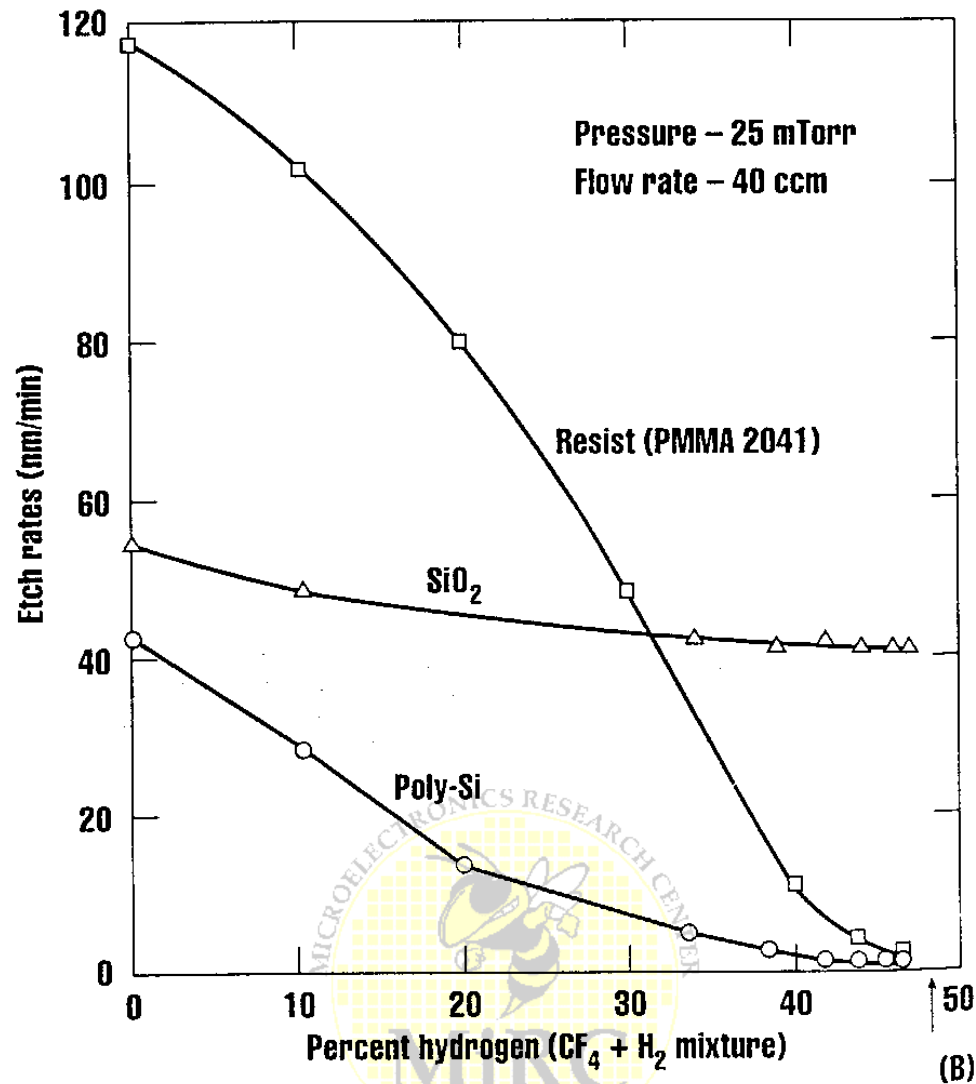
F^- : CF_4 , SiF_4 , SF_6
 Cl^- : CCl_4 , $SiCl_2H_2$,
 $SiCl_4$, BCl_3 , Cl_2
 O_2
 H_2
 Ar
 He



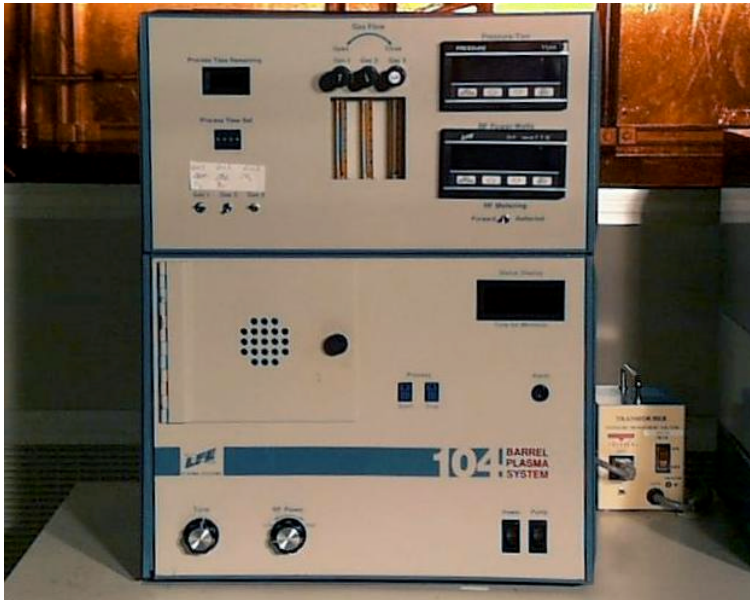
Chemistry



Chemistry



Barrel Etcher & Ozone Stripper

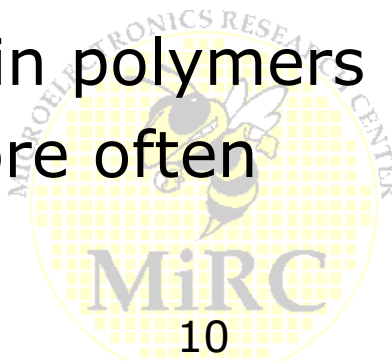


CF_4 , O_2 , Ar

- Better for thin polymers like photoresist
- Available more often



$\text{O}_2 \rightarrow \text{O}_3$



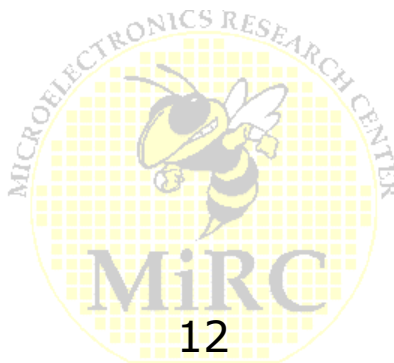
Suggestions

- Clean chamber before use
- Try to minimize quantity to be etched
- Be observant
- Load samples into center of chamber
- Processes should never run less than 10 minutes (for uniformity, consistency)
- Avoid extraordinary parameter values



Warnings

- All processes utilize toxic gasses
- Surface residues may also be toxic
- Allow chamber to purge before opening
- Silanes are explosive in the atmosphere



Bibliography

Campbell, Stephen A. *The Science and Engineering of Microelectronic Fabrication.* 1996.

<http://grover.mirc.gatech.edu/equipment/>

<http://grover.mirc.gatech.edu/processinfo/>

