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Producing Smoothly Etched Surfaces using RIE

Reactive ion etching of materials is a common technique used for a variety of applications. RIE can be used for pattern generation, failure analysis, or global etch back of films. In certain applications it is desirable to produce a blanket etch on a material where the entire surface remains smooth and free of roughening artifacts. Some basic guidelines to achieving this using the RIE 2000 system are given below.

Etching of SiO_2

Process Recipe: 90% CF_4 / 10% O_2
Pressure: 10 mTorr

After a period of time the surface of the SiO_2 film may begin to roughen due to ion bombardment. Reducing the surface roughening can be done by using a low DC Bias and a relatively high pressure. The pressure is adjusted to a range of 35-70 mTorr for optimum results but will vary with pattern density, geometry of the etch profiles, specimen material, and many other factors. Reduction of the DC Bias can only be achieved by lowering the RF power.