Polyimide Etch
Application Note

Material	Etch Gases	Reactive Species	By-product
Polyimide	1st step: O_2 / 6% CF_4 2nd step: 50% O_2 / Ar	Monatomic oxygen and/or ozone with the C from CF_4 aiding in organic removal	CO and H_20

There are many varieties of polyimide on the market today. They have different curing properties, solids content, etc. However, they are all hydrocarbons, and most etch readily in oxygen plasmas. This reaction is a simple oxidation of the organics as shown in the following equation:

$CxHy\ (s) + O_2\ (g) + plasma$ ---------> $CO\ (g) + H_2O\ (g)$

The main problem, in the removal of polyimide, is insuring that the polyimide does not over heat during the process. If this occurs the polyimide can carbonize, leave a grass like residue, and be virtually impossible to get off. Reducing the ion bombardment solves this problem; running very low power, and/or "floating" the sample in the plasma, and/or using a hybrid reactor can accomplish this.

A good starting recipe for polyimide* removal is:

Parameter	Value	Comment
Pressure	200-mTorr	Relatively high pressure = low voltage
Power (RIE/ICP)	20 / 500-watts	Relatively low power low voltage
O_2 / CF_4	47 / 3-sccm	Sufficient flow for most processes
Etch Rate	1-μm/min	

**Note: Running a 50% O_2/Ar step after the polyimide has been almost completely removed, <50-nm remaining, can drastically improve the cleanliness of the results. The conditions are just like the ones listed in the above table, with the obvious change from O_2/CF_4 to O_2/Ar. Since polyimide is usually followed by a layer that does not etch in oxygen or argon (nitride/oxide), over-etching is not an issue.*

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