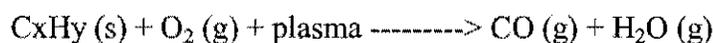


Polyimide Etch Application Note

Material	Etch Gases	Reactive Species	By-product
Polyimide	1 st step: O ₂ / 6% CF ₄ 2 nd step: 50% O ₂ / Ar	Monatomic oxygen and/or ozone with the C from CF ₄ aiding in organic removal	CO and H ₂ O

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:



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% O₂/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 O₂/CF₄ to O₂/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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