



Xiaoyu Niu <xyniu@utexas.edu>

Silicon etch

3 messages

Xiaoyu Niu <xyniu@utexas.edu>
To: Yoonho Seo <yhseo@utexas.edu>
Cc: Neal Hall <nahall@utexas.edu>

Tue, Jun 8, 2021 at 11:11 AM

Hi Yoonho,

In the Harman project flow file, you select the "Plasma-Therm" tool to etch the silicon wafer. I find three "Plasma-Therm" tools that can etch silicon, (i)Etcher ICP Deep Silicon PlasmaTherm Versaline, (ii)Etcher RIE 790 Plasma Therm #2, and (iii)Etcher RIE Batchtop PlasmaTherm.

Which one do you prefer? And what are the differences between them?

Thanks,
Xiaoyu

YOONHO SEO <yhseo@utexas.edu>
To: Xiaoyu Niu <xyniu@utexas.edu>
Cc: Neal Hall <nahall@utexas.edu>

Tue, Jun 8, 2021 at 12:12 PM

Hi Xiaoyu,

Regarding your questions...

1) Etcher ICP Deep Silicon Plasma Therm Versaline

This tool uses ICP to generate plasma. More specifically, it uses the "Bosch process" to etch silicon. The process is specifically designed for deep Si etching. You can easily find the details about the process on wikipedia. https://en.wikipedia.org/wiki/Deep_reactive-ion_etching#Bosch_process

The etching process is pretty harsher than other etching processes and it generates a lot of heat. Most of the time, hardmask (such as Al₂O₃ and AlN) is preferred over softmask (like PR). PR can be easily burnt out during the process. But if your process is very short (like 10 or 20 cycles), you may consider the softmask. But.. the clamp ring in the tool touches your wafer, and if you have PR over your wafer, you should be careful, because the PR touching the clamp ring will be melted during the process then it will be stuck to the clamp ring and the wafer will not be unloaded. You might want to selectively remove the PR around the clamping area to prevent this.

(2) and (3)... they are pretty much the same. But the difference is mostly which material is etched in the tool frequently. I think Batchtop one mostly etches Si. But Plasma Therm #2 etches various materials, which might cause some cross contamination issues.

For the Si etching of a few micron thickness, I would prefer just Oxford RIE 80 or Deep Si etcher if it is easy to deposit a hard mask.

Thanks,
Yoonho

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Xiaoyu Niu <xyniu@utexas.edu>
To: YOONHO SEO <yhseo@utexas.edu>
Cc: Neal Hall <nahall@utexas.edu>

Tue, Jun 8, 2021 at 12:44 PM

Hi Yoonho,

Thanks very much!
Your answers are fairly helpful!

Have a good day!
Xiaoyu

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