

Date: 14 Jan 99 19:36:51 EST
Subject: RF sputtering
To: cgl@coos.dartmouth.edu (Christopher Levey)

Hi Chris!

Phil did some work on the glycol flow rates and we seem to be better off than we were (apx. 1 GPM which, acc. to ENI RF supply specs should be more than enough). I have done some work on the vacuum system (i.e. new vacuum tubes as we discussed and I also replaced the MP oil). I did a preliminary pump down today. It took about 4min to pump down from ATM to 100mTorr in the chamber which is about half the time it took before. So, we are in better shape there.

I'd like to re-test the RF sputtering of Al₂O₃ (target currently in the system) to see if the cooling glycol will really allow the RF power supply to sputter longer w/o overheating. If I pump down the system in the morning, would you be available around 2pm to try an RF sputter again? Let me know if this time works for you or if there is a more convenient time.

Kip

From: Kip.D.Coonley@Dartmouth.EDU (Kip D. Coonley)
Subject: Re: sputtering system
To: Zoe.R.Courville@Dartmouth.EDU (Zoe R. Courville)
Cc: Gunnar.Stolze@Dartmouth.EDU (Gunnar Stolze),
cgl@coos.dartmouth.edu (Christopher Levey)
Status: OR

You asked about possible causes for the fluctuating plasma arc in the sputtering machine in the cleanroom. I've had a chance to do some reading and look through the manual.

Sometimes when a target is first turned on, regions of high field due to pits or edges in the target face can cause local arcing of the plasma. These arcs appear as intermittent flashes of light and current spikes. After a little

sputtering, this problem should go away as the target face gets "cleaned".

Increasing the power level until a steady discharge is obtained is recommended in the manual.

Another cause of an erratic plasma arc may be base pressure. If a low base pressure is not reached, atoms or molecules other than the inert gas being flowed into the system (usually Argon) can impact the target face with difference momenta which can cause a weird plasma arc.

One clear reference to an intermittent plasma in this system occurs on page 0015 of the cleanroom manual. The group depositing this film was using an Al target. They had reached a base pressure of 1.5×10^{-5} Torr before flowing Argon. They took the time later to sputter etch the target and it worked fine for a while. Another reference for this same material appears on page 0041 where pulsating plasmas were noted.

The magnets in target #1 were replaced at one time (see page 0041 in manual) and an arcing problem initially occurred until the correct magnet arrangement was set-up. It has worked fine after that and no more arcing was noted.

I hope this helps. Let me know how things work out or if you need some more information.

Kip
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