Gaertner Ellipsometer system

Ellipsometry is a non-contacting, nondestructive technique for the measurement of surfaces and very thin films on surfaces using elliptically polarized light. The model L116S300 for up to 300mm wafers builds on the production proven Gaertner line of ellipsometers in widespread use throughout the world. From thin gate oxides only tens of angstroms thick to thick polyimides and photoresists. Gaertner has earned a reputation for providing precise, reliable results. Ellipsometer can detect film and surface conditions less than an Angstrom thick.

Location: Clean room, NCF

Training: 3 sessions (2 trainings and a checkout session)

- Product info : http://www.gaertnerscientific.com/ellipsometers/L116S300.htm

- **System Features:**

- Measures complete state of polarization useful for rough, scattering samples.
- Accurate, stable measurements using spectrally precise laser ellipsometry.
- Simple, compact tabletop instrument - competitively priced.
- Alignment : Built-in axis of rotation of incident arms is in the sample plane. Angles are easily selectable with no need for alignment prisms or sample readjustment. ⍰ Incidence Angle : 30° ~ 70°
- Method of Measurement : Advanced StokesMeter measurement head
- Measurement Time : Practically instantaneous
- Light Source : HeNe 6328 Angstrom Laser gives less than 1 mW output on sample
- Beam Diameter : 1mm diameter (1 x 3mm on wafer @ 70°) Laser parameters

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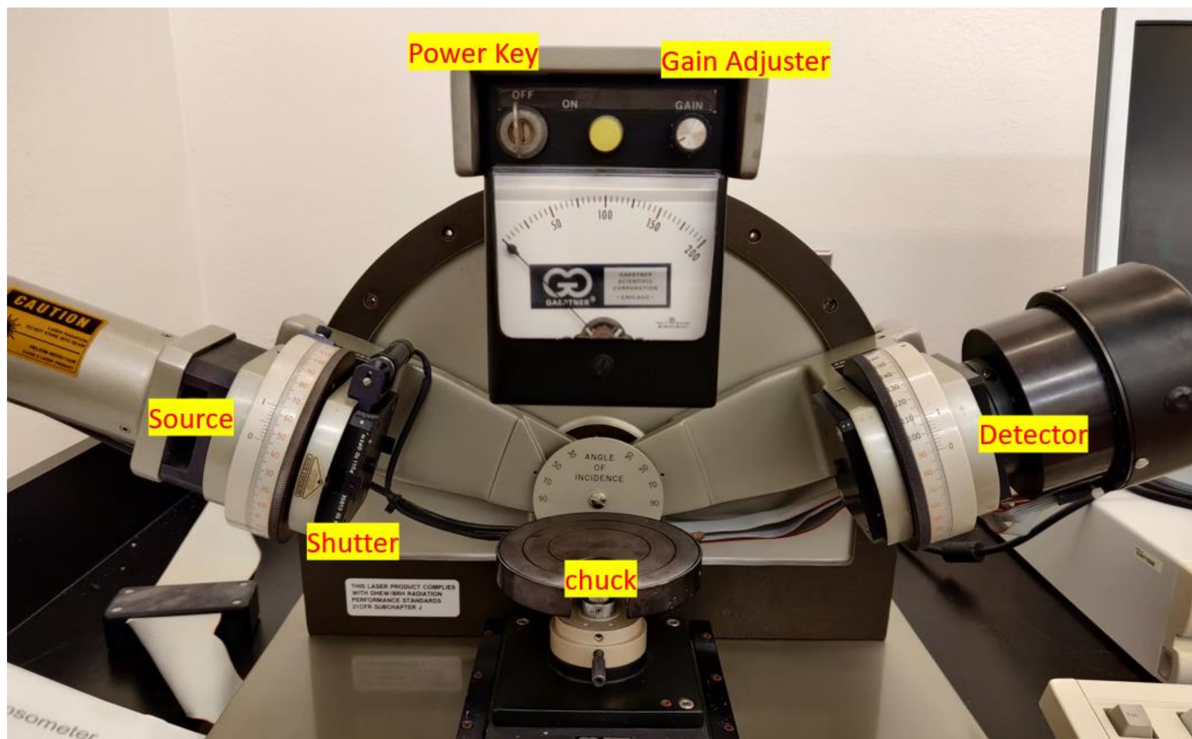
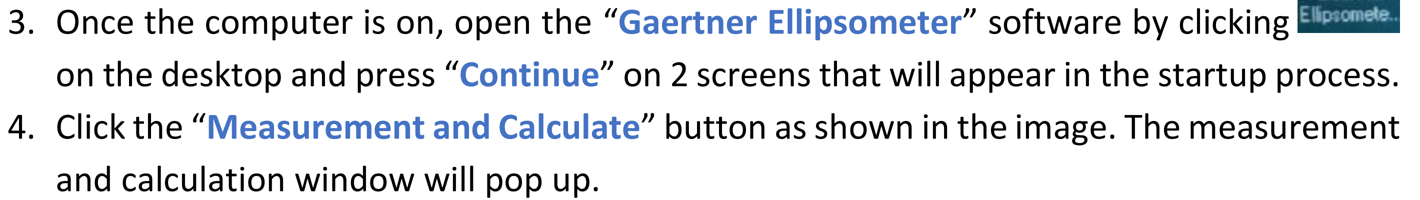
Standard Operating Procedure

1. Turn on the computer by pressing the power button on the PC.

2. Turn on the Ellipsometer by turning the key to “ON” position.



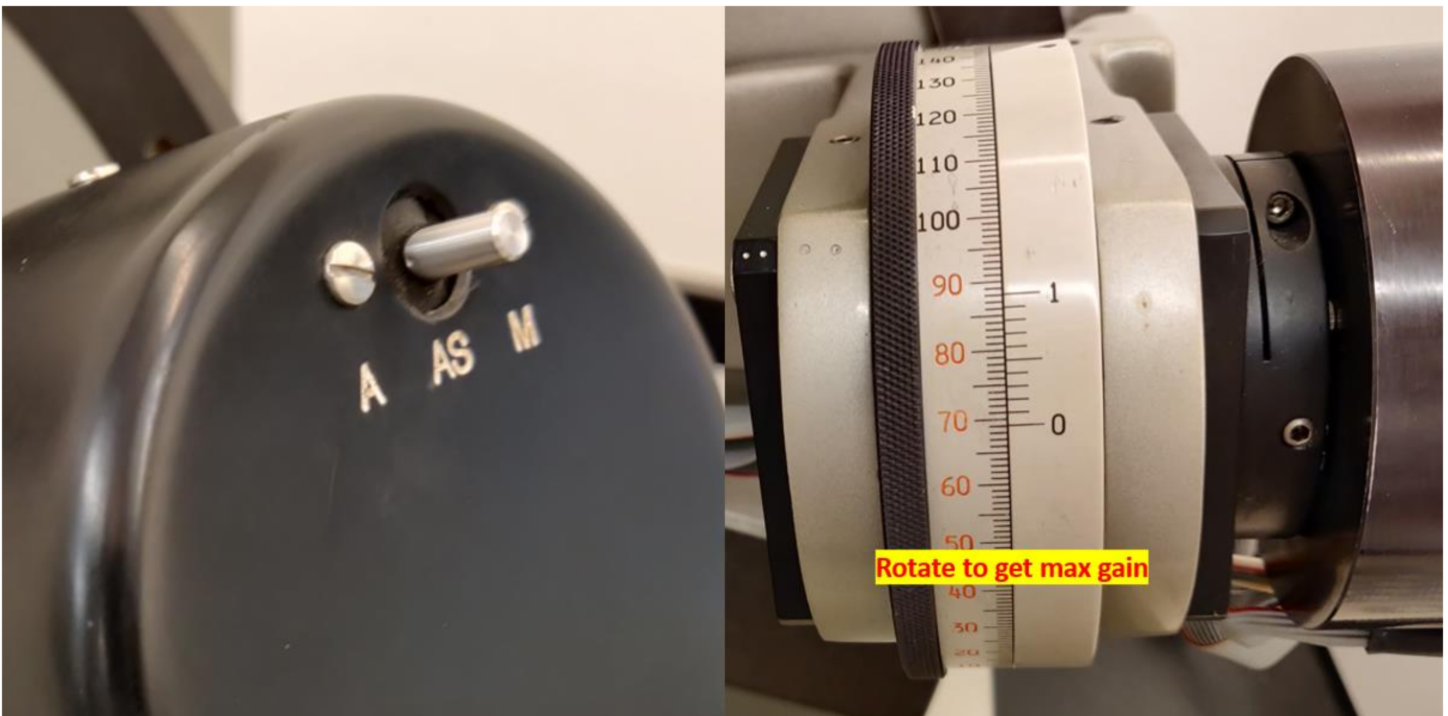


3. Once the computer is on, open the “**Gaertner Ellipsometer**” software by clicking on the desktop and press “**Continue**” on 2 screens that will appear in the startup process.
4. Click the “**Measurement and Calculate**” button as shown in the image. The measurement and calculation window will pop up.

5. On the ellipsometer, **open the shutter** by pulling it. This will enable the laser to reach the detector.
6. **Place the sample** on the chuck. Adjust the z-height if needed.

Note: The z-height adjustment is needed when the sample has varying thickness. Check on the detector arm if the red dot is in the center of the detector slit. If not, use the rotating knob to adjust the height of the stage.

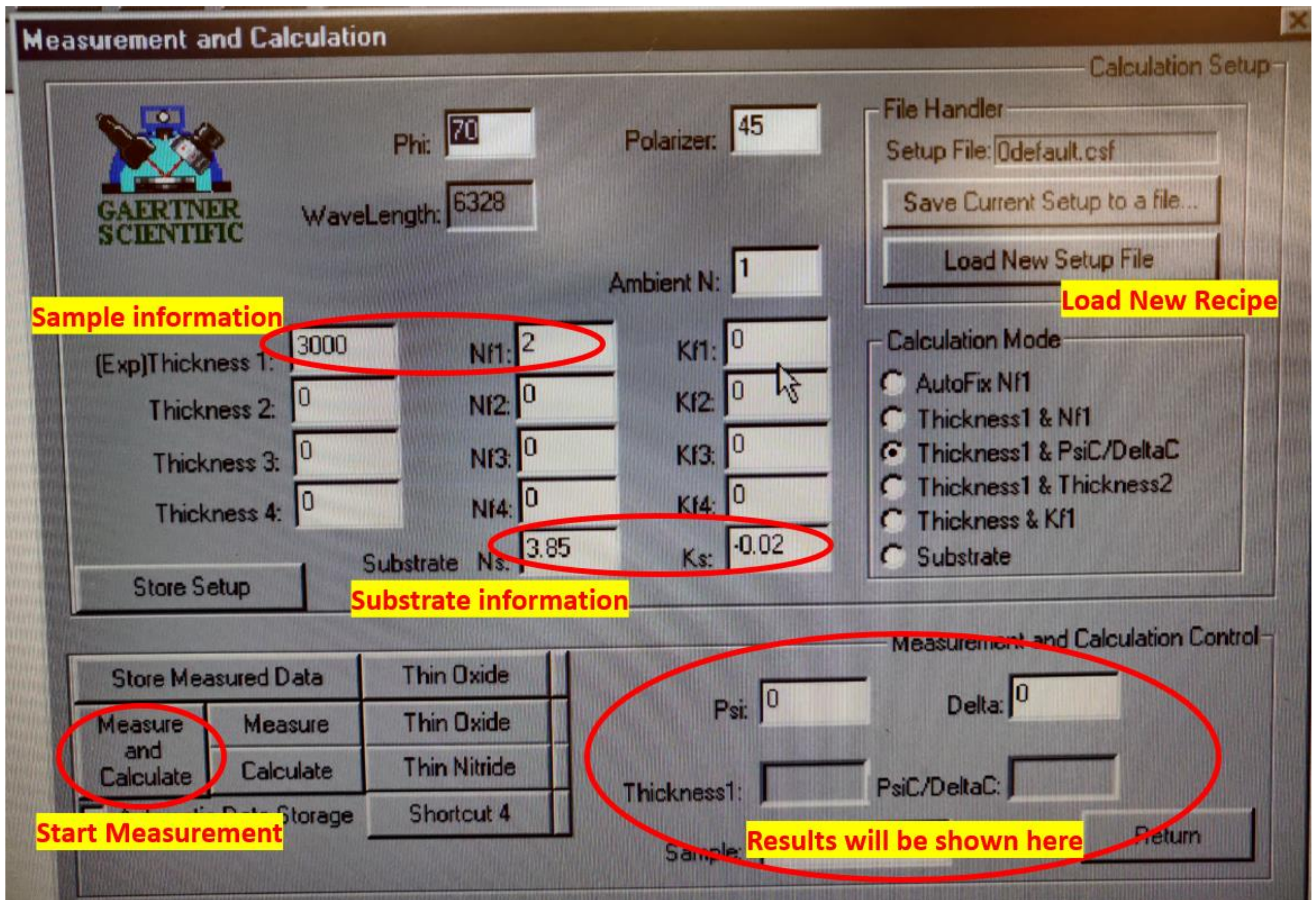
7. Switch the detector to the **“M”** mode and increase the gain a little bit using the gain adjust knob.



8. **Turn the rotary on detector** till you get the maximum gain.
9. Re-adjust the gain to make sure it is ~**100**.
10. On the software, load pre-existing recipes by clicking “**Load New Setup File**”
11. Once the recipe is loaded, **enter the details about the sample** and the substrate. This would usually include the expected thickness, refractive index and kf value (Extinction coefficient).
12. Select the appropriate **calculation mode**. For details on each mode, refer to appendix.
13. Click “**Measure and Calculate.**” This will start the measurement. Each run takes ~5 seconds

Note: It is recommended that you run multiple runs by varying the expected thickness.

14. The results will be shown in the lower right corner. Note the value.



APPENDIX

- **Autofix Nf1 –** Adjusts the refractive index and thickness to fit the curve. Use if not sure about refractive index.
- **Thickness and Nf1 –** Adjusts the thickness and refractive index both.
- **Thickness and PsiC/DeltaC –** Adjusts the thickness and PsiC/DeltaC value.
- **Thickness 1 and 2 –** This will adjust thickness only for multiple layers.
- **Thickness and Kf1 –** This will adjust the thickness and extinction factor.
- **Substrate –** Useful for substrate measurements only.