

Application of SolidSpec-3700 with the Automatic X-Y Stage -Measurement of Transmittance Distribution Map of Sample Plane-

SolidSpec-3700/3700DUV comprises versatile features as follows, the high sensitivity deep ultraviolet analysis, 3 detectors equipped and a built-in large size sample compartment as standard etc.,. By mounting the automatic X-Y stage (optional) in the large size sample compartment, sample plane transmittance

distribution mapping and other types of time consuming manual measurements can be efficiently conducted. We describe here an example of measurement of the transmittance distribution of a film sample using the automatic X-Y stage.

■ Automatic X-Y Stage

Using the automatic X-Y stage attachment (Fig.2), multipoint distribution measurement and other time consuming measurements can be efficiently conducted. The coordinate format allows selection of rectangular coordinates (xy) or polar coordinates ($r\theta$), enabling measurement of samples as large as 310mm square or 310mm ϕ . The size of the light beam in the measurement plane is about 5mm \times 10mm as standard, however, by using a mask(aperture), the size of light beam can be reduced to 1mm ϕ . Fig.3 shows an exterior photograph of a 12-inch silicon wafer set on the X-Y stage mounted inside the sample compartment.

In addition, the usefulness of this attachment is further demonstrated in its ability to perform automatic multipoint measurements without breaking the nitrogen purge, even in deep ultraviolet measurement. Both transmittance and reflectance measurements are possible using the automatic X-Y stage.



Fig.2 Automatic X-Y Stage



Fig.1 SolidSpec-3700DUV



Fig.3 12-inch Wafer Set on Automatic X-Y Stage

■ Measurement of Transmittance Distribution Map of Film used for Semiconductors

Transmittance measurement with the automatic X-Y stage was conducted on the special film used in the field of semiconductors. The film (vertical 163mm × horizontal 160mm) was fixed in a plastic frame and the plane transmittance distribution measurement (50 points transmittance data) was conducted.

At first, a program was created for conducting the 50-point automatic measurement. This program is shown in Table 1. The rectangular coordinates/polar coordinates (A) and transmittance measurement/reflectance measurement (S) selection parameters are set in the first 2 lines, respectively, and the measurement points are set from the third line. The program can be created easily using a text editor. In

this measurement, a mask was used to reduce the light beam to 2mm ϕ .

Table 2 shows the transmittance data on the plane for first 20 of the total 50 data points. Measurement was conducted using the 2 wavelengths of 248nm and 365nm (analysis was completed in about 20minutes). A high transmittance was shown over the entire film. Fig.4 shows a graphic representation of the transmittance distribution at 248nm. Usually these measurement are done by hand power and very time consuming, however the automatic measurement with the simple program and the automatic X-Y stage can shorten the measuring time.

Table 1 Program used for Obtaining Transmittance Map

```
A 0
S 0
M 28 28
M 44 28
M 60 28
M 76 28
M 92 28
M 108 28
M 124 28
M 140 28
M 156 28
M 172 28
M 28 65
M 44 65
M 60 65
M 76 65
M 92 65
.
```

Table 2 Transmittance for 20 of 50 Data Points

No.	248nm	365nm
1	99.46	99.26
2	99.29	99.60
3	99.36	99.58
4	99.37	99.53
5	99.43	99.46
6	99.52	99.45
7	99.41	99.54
8	99.51	99.50
9	99.41	99.51
10	99.38	99.38
11	99.19	99.49
12	98.90	99.59
13	99.09	99.56
14	98.67	99.51
15	98.83	99.52
16	98.11	98.86
17	98.59	99.60
18	98.73	99.56
19	99.29	99.57
20	99.06	99.52

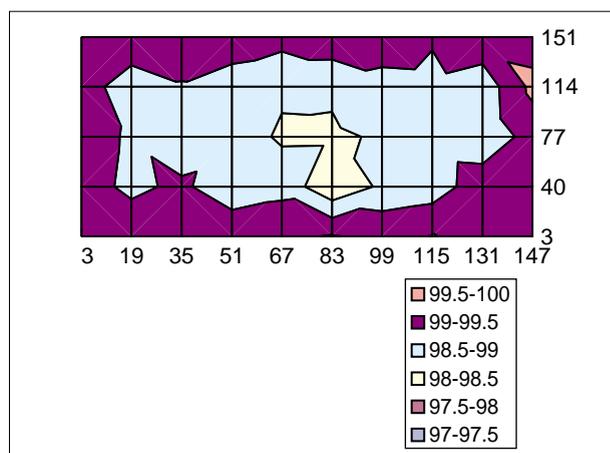


Fig.4 Transmittance Map Obtained at 248nm



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