| ASU FLEXIBLE DISPLAY CENTER | Document Owner:

Barry O'Brien | Release Date: |
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| Document Title:
Woollam Process Procedure | Document No: | Document Rev: 01 |

SPECIFICATION FORMAT:

EQUIPMENT MANUFACTURER: J.A. Woollam Co., Inc.

EQUIPMENT MODEL: FPD-110

FDC ASSIGNED TOOL ID NUMBER: ASU Property Control #4027580

APPLICATION PROGRAM(S) AND REVISION: Microsoft Windows XP
Vase Manager 1.782
WVase 32 3.616

Table of Contents

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Page 2 of 7

1.0   Purpose

1.1   To define the operating procedures for the Woollam variable angle spectroscopic ellipsometer measurement system.

2.0   Scope

2.1   Outline the weekly qualification requirements for the Woollam measurement system.
2.2   Define data acquisition procedures.
2.3   Describe data analysis.

3.0   Associated Materials and Equipment

3.1   Deionized water.
3.2   Isopropyl alcohol.
3.3   150mm silicon wafers.
3.4   Nilfisk vacuum cleaner.
3.5   Clean room wipes.
3.6   Wafer cassette – Fluoroware PA182-39M or equivalent.
3.7   Native Oxide wafer
3.8   Thermal Oxide wafer

4.0   Safety

4.1   The Woollam system has safety interlocks on the lid and covers of the system.

4.2   Always wear clean room gloves when cleaning the stage, and dispose of used wipes and gloves in the solvent waste can.

4.3   The Woollam has moving mechanical parts, keep fingers clear when robot, might be in motion.

5.0   Data Acquisition/Analysis Procedures

5.1   Confirm the Lamps have been on >30 minutes. If not, Push the "Lamp Power", Green Button on the control panel and wait 30 minutes before using the Woollam.

5.2   The system will automatically logoff the WVASE system. If the monitor is dark push "enter" on the key pad. The "Owner" pop-up screen will appear, click the mouse on the screen.

5.3   Click the "Vase Manager" button at the bottom of the screen.

5.4   The Measurement Screen will appear. Select a "Project". Select a "Recipe".

5.5   Beside the "Description" bar, type in a sample description.

5.6   Click on the "Measure" bar.

5.7   The "Sample Measurement" screen will appear. If any of the information is incorrect press "Cancel Measurement" otherwise press "OK".

5.8   A "Sample Unload Procedure" window pops-up.

5.9   Open the Sample-Chamber Lid and load the new sample. After the new sample is loaded, you MUST close the Sample-Chamber Lid.

5.10   Slide the Plexiglas lid open.

5.11   The alignment jig is used to perform optical alignment of the wafer.

5.12   Load wafer using the jig. Lift Teflon alignment pins and place each pin in the proper slot for the diameter of the wafer. Place the major flat facing the two pins closest together.

5.13   Press the Green "ON" button for Sample Vacuum.

5.14   Sample Door Green Button is Unlocked

5.15   Slide the Plexiglas lid closed.

5.16   Press the "OK" button on the monitor.

5.17   The program proceeds by checking the alignment of the sample.

5.18   The ellipsometer will measure and fit the sample data. This is on the "Acquire Data" screen which pops-up automatically.

5.19   The results are reported after the program is finished.

5.20   The "VASE Manager Message" screen appears after the scan is complete.

5.21   This screen gives the averages for "Thickness", "Index", and "MSE".

5.22   The MSE (mean-squared error) should be <10.

5.23   Data is displayed in a green box, press "OK". If the box is red, notify engineering.

5.24   A "Sample Unload Procedure" window pops-up.

5.25   Open the Sample-Chamber Lid and load the new sample. After the new sample is loaded, you MUST close the Sample-Chamber Lid.

5.26   Verify the Amber Sample Door Interlock light is off on the control panel.

5.27   Slide the Plexiglas lid open.

5.28   Unload the wafer.

5.29   Press the White "OFF" button for Sample Vacuum.

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Page 4 of 7

5.30   Verify the sample Door Green Button is Unlocked

5.31   Slide the Plexiglas lid closed.

5.32   Press the "OK" button on the monitor.

5.33   Click on the "View Data" button. This shows all of the samples that have been measured and saved. Details can be seen by selecting the sample.

5.34   To save a sample on a thumb drive, insert thumb drive located on the bottom front cut out panel. Press "Save to Disk" and follow instructions.

6.0   Weekly SPC/Native and Thermal oxide

6.1   Weekly qualification measurements must be performed before running any material.

6.2   The Native oxide is the surface oxide layer which grows naturally in atmosphere.

6.3   The Thermal oxide is grown on Silicon and is thicker than the Native oxide.

6.4   Click the "Vase Manager" button at the bottom of the screen.

6.5   The Measurement Screen will appear. Select a "Project". Select a "Recipe".

6.6   Select "Weekly Calibration". Select "Native Oxide QUAL". Or "Thermal Oxide QUAL".

6.7   Beside the "Description" bar, type in a sample description. For example, "060830-native".

6.8   Click on the "Measure" bar.

6.9   The "Sample Measurement" screen will appear. If any of the information is incorrect press "Cancel Measurement" otherwise press "OK".

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Arizona State University – Flexible Display Center confidential information. Hardcopy may not be current document.

Page 5 of 7

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6.36   **Weekly SPC to check the lamp intensity.**

6.37   Click on "WVase" on the bottom of the screen.

6.38   Click on the "Hardware" button on the top right side of the screen.

6.39   Click on the "Load Sample" button on the top left side of the screen.

6.40   Load the Thermal Oxide wafer.

6.41   The pop-up screen will appear when the tool has completed the check. Unload the Thermal Oxide wafer.

6.42   Click on the "Display Signal" button on the top left side of the screen.

6.43   A pop-up screen will appear. Click on the "OK" button at the bottom of this screen.

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Page 6 of 7

6.44   Record the AC,Gain,DUV,UV,NIR readings.

6.45   Record the lamp hours located on the right front of the machine.

6.46   Record all of these readings in the MES system. To download data press "Non Lot Data Collection" located on the first menu page. Use the pull down menu to choose "Ellipsometer". Use the second pull down menu to choose "Ellipsometer Lamps".

7.0   Maintenance/ Engineering

7.1   Engineering will monitor SPC charts.

7.2   Notify engineering/maintenance of alarms.

7.3   Do not operate machine while maintenance is being performed.

7.4   Weekly qualifications will be performed after maintenance has returned machine to engineering.

7.5   Notify engineering/maintenance if the Woollam does not meet specifications.

7.6   Engineering will review results of SPC tests before returning machine to production status.