

University of Minnesota Nano Fabrication Center

Standard Operating Procedure

Equipment Name: Nanospec 1

Coral Name: nanospec-1

Revision Number: 1

Model: 200

Revisionist: K.Burkland

Location: Bay 1

Date: 11/03/03

1 Description

The NANOSPEC/AFT is a computerized film thickness measurement system. The Nanospec separates light from a white source into its component wavelengths, from 480 to 800 nanometers. The interference of the light waves is then measured using several algorithms and thickness is determined. This instrument offers programs on thirteen specific film types, relative reflectance, and multipurpose thick film capability. A dielectric film in the range of the instrument extends from less than 100Å to 40,000Å, with a reflectivity of +/-2% to +/- 5%. The following table lists measurement beam size vs. objective:

LENS	BEAM SIZE (microns)
5X	70
10X	35
40X	14
100X	3.5

2 Safety

a Avoid eye contact with the laser to prevent eye damage.

3 Restrictions/Requirements

- a Must be a qualified user
- b The substrate can not be transparent.

4 Required Facilities

5 Definitions

a Reference wafer: A bare silicon wafer,

6 Setup

- a To calibrate the system, turn the red switch on the AC power supply to OFF, wait 10 - 15 seconds and move the switch to ON.
- b Follow the instructions on the screen:
- c Check the wavelength above the microscope (*Is it 480nm?*).
- d If it is, press [Y] on the keyboard.
If not, press [N] on the keyboard and enter the number shown on the counter. Repeat if necessary.
- e *Data Bank Option?* [N]
- f *REFR INDEX OPTION?* [Y]
- g *Rotate lens to eliminate light.* Move the lens so it is between objectives.

University of Minnesota Nano Fabrication Center

Standard Operating Procedure

- h *Adjust zero to 0.5 - 1.0* There is a dial labeled ZERO underneath the wavelength readout above the stage. Turn the knob until the led on the left reads the correct number.
- i *Focus on reference with 10 x objective.*
While looking into the eyepiece, focus on the wafer. If it is NOT focused, a large round spot with blurred edges is seen. Using the focus adjustment knobs located on the front right corner of the microscope stand, focus until the circle with the blurred edges turns into an octagon. Adjust the gain control so the photo intensity meter reads between 31.0 -32.0. This dial is located next to the ZERO dial.
- j Press [RETURN]

7 **Operating Instructions**

- a Press [C] to calibrate the system.
- b The stage slides left and right. The bare silicon monitor wafer is kept the left; place the wafer to be measured on the right.
- c Follow the instructions on the screen: *Switch to printer?* Press [N].
- d *Enter Film Type.* Select the number to the correlating film that is to be measured. Press [Return]
- e *Enter OBJ Lens.* 1 = 10 X, 2 = 40 X, 3 = 100X
- f *Scan New Reference Wafer?* Press [Y]
- g *Focus on Reference Wafer* The measurement occurs in the area inside the black dot. Press [M].
- h *Enter Sample #.* This is not an option; Measurements cannot be stored or restored. Press [Return]
- i *PLS Focus on Sample* Press [M]
- j *Enter the Ref Index:* You may type a refractive index or press [Return] for the default refractive index for the film selected
- k For repeated measurements, *press [M]*
- l Select [C] for a new set of data.

8 **Problems/Troubleshooting**

- a If the sample is not flat enough, it is necessary to adjust the gain while taking the measurements over the samples surface.
- b If the sample is unable to be measured, one of the following messages will be displayed: UNDER RANGE, LESS THAN 100Å, OVER RANGE, LESS THAN 20Å. The measurement will automatically be rejected.