

Filmetrics F40

SOP

The F40 is a reflectometer used to measure the thickness and optical constants of thin, transparent/semi-transparent films. By fitting it to a microscope the tool can have a measurement spot size down to $\sim 10\mu\text{m}$. Commonly measured films include, oxides, nitrides, photoresists, polysilicon and optical coatings. Films that cannot be measured include very rough films and metal films.

Safety

- **Buddy System** – the Buddy System is not needed for after hours usage of this equipment

1.0 Pre-Operation

- 1.1 Tool Reservations may be made via the NRF Reservation Page.
<http://nimet.ufl.edu/servicecenter/resources/default.asp>

2.0 Restrictions

- 2.1 None

3.0 Operation

- 3.1 Turn on top lamp for microscope to highest setting. Power button and control knob are on the right side of the microscope.
- 3.2 Double click the Filmeasure icon to start the software if not already running.
- 3.3 Log on
 - 3.3.1. Name = nrfuser
 - 3.3.2. Password = nrfuser
- 3.4 Click the “Live video” tab
- 3.5 Select recipe from pull-down menu. If a recipe needs to be created, contact the NRF staff and one can be made relatively easily if your film is in our database. A list of existing material files in our database is located in section 4.1. If a material file does not exist then we will need a sample of your film to create one.
- 3.6 Select the objective...10X seems to work best. Objective versus measurement spot size and thickness range is shown in section 4.2 and 4.3
- 3.7 Place your sample on the stage and focus on the surface. Films without topography can be difficult so close the F-Stop aperture and adjust focus until the edges of the aperture appear sharp.
- 3.8 Click the “Baseline” button. A baseline needs to be done when first logging onto the tool, when changing objectives, or after adjusting the light source. Failure to do so will result in larger measurement error.
- 3.9 Click the “Acquire sample” button.
- 3.10 Remove your sample and place the Silicon reference on the stage and focus.
- 3.11 Click the “Acquire reference” button.
- 3.12 Remove the Silicon reference and place the 45° Tilt Reference on the stage.
- 3.13 Click the “Acquire background” button.
- 3.14 Click the “Finish” button
- 3.15 Place your sample back on the stage, focus, and click the “Measure”

button.

3.16 Check that the measurement makes sense and the Goodness Of Fit (GOF) for the model is close to 1.

3.17 When finished, log out of the Filmeasure software and write your stop time in the logsheet.

4.0 File Management

4.1 You can save a screen shot to file as an image. Click File→Save screen to file, or you can click on the icon that looks like a screen with a diskette.

4.2 The measurement spectrum can be saved by clicking on the diskette icon. They can be saved as Filmetrics files or a csv file that can be opened in Excel.

4.3 If multiple measurements were made, the measurement history can also be saved. Click on the “History” tab, select any unwanted files from previous users and click the “Delete selected” button. Now, either click “Copy” and then paste it to Excel, or click “Save as” button and save it as a csv file.

5.0 Appendix

5.1 Materials Database

Photoresist	Dielectric	Semiconductor	Metal	Other
APEXE	Acrylic	Al10Ga90As	Ag	CDdye
AQUATAR	Acrylic2	Al20Ga80As	Al	CoSi2
AR2600DUV	Al2O3	Al30Ga70As	AlCu	DLC
ArFS05	AlON	Al32Ga68As	Au	Fe2O3
ArFS10A	BaTiO3	Al42Ga58As	Co	ITO
AZ1518	BK7	Al49Ga51As	CoWP	NiP
AZ6112	Black Diamond	Al59Ga41As	Cr	PZT
AZ6210B	BSG	Al70Ga30As	Cu	TiN
AZ7209	CaF2	Al80Ga20As	Mo	TiN-Palik
AZ7510	CORAL	Al90Ga10As	Ni	
AZ7700	CR39	AlAs	Pt	
AZ9260	Diamond	AlGaAs	Rh	
AZEL2015	DLCarbon	AlN	Stainless steel	
AZNOVA2071	HC Standard	AlSb	Ta	

AZOFPR-800	HC Standard2	Carbon Am	Ti	
AZp4110	HfO2	CdS	W	
BARLi	KCL	CdTe		
FUTERREX NR9	MgF2	GaAs		
LOR-3B	MgO	GaN		
MMA-MAA COPOLYMER	Parylene	GaP		
PMMA	PET	GaSb		
RTC	Polycarb	Ge		
S1813	Polyolef	InAs		
SP570	Polystyr	InGaAs		
SPR2FX13	Pyrolitic Nitride	InGaAs24P76		
SPR2FX13JL	Quartz	InGaAs42P58		
SPR2FX13JM	Si3N4	InGaAs55P45		
SPR3000	Si3N4 (Si Rich)	InGaAs82P18		
SPR3500	Si3N4 thin	InP		
SPR500A	SiO	InSb		
SPR700	SiO2	PbS		
SPR850	Thermal Oxide	PbSe		
SPR900	TiO2	Si		
SPR950	TiSi2	Si_Am		
SPR955CM	ZrO2	Si_Poly		
SYSTEM8		Si_Poly_Brugg		
UV2HSDUV		SiC		
UV3DUV		ZnS		
UV5DUV		ZnS_cub		
UV6DUV				

5.2 Objective – vs – Measurement Spot Size

Objective	Spot Size
4X	100µm
10X	40µm
20X	20µm
50X	10µm

5.3 Objective – vs – Measurement Thickness Range

Objective	Thickness Range
4X	~25nm - 20 μ m
10X	~25nm - 15 μ m
20X	~25nm - 10 μ m
50X	~25nm - 2 μ m