Basic Operation manual for DFM mode



1. Program Start-up

- (1) Turn on power of the electric equipment part.
- (2) Turn on the PC.

- (3) Double-click to start the software 『Spisel32』.
 → 【NanoNavi Selector】 is displayed.
- (4) Check selection items of NanoNavi Selector.
 [Unit] : [Nanocute]
 [Mode] : [DFM]
 [Language] : [English]
 - $[OK] \rightarrow SPIWin program is started.$







(1) Select [Easy Menu (M)] in [Setup (U)].

🗻 NanoNa	viRealNanocute(DFM)	
File(F) S	etup(U) Scan(S) Tool(T) C	olor(C) Graphics(G) Analysis(A) Batch(B) Recipe(R) Window(W) Help(H)
	Easy Menu(M)	🖽 🔝 🌑 📖 🗔 📭 🔂 🐨 📭 🐨 🖓 🖘 🗶 📓 🚹 🚺 💷 🗠 🏧
\square	Console(C)	V
	PZT(Z) Monitor(Z)	
	CCD Monitor(D)	
	Laser(L)	
	Laser Position(P)	
	Impact Stage(I)	
	Sample Change(S)	
	Transfer	
	System Infomation(N)	

(2) Click [Next >].

🔜 Easy M	lenu	8
Init .S I Scan p I Scan P I Appro: I Scar	Scan mode set	1. Set the scan mode and the scanner type. Click [Next].
SMP CHG	POS CHG Restart	< Prev Next >
Scan mod	le and Scanner Set	23
Mode	DFM 💌	Auto Scan Off 💌
Level	Beginner	
Scanner	20um(Nanocute)	Change

3. Sample Set

(1) Open the noise-proof cover.



(2) Stage height.

Lower the sample stage to the safe position by [Preset] out.

Scan prep	Sample set	 Remove the optical microscope, optical head and cantilever holder. Lower the sample stage to the safe position. Set the sample. Adjust the measurement place on the sample to the center of the CCD image. 		
Scan PRM	Laser adjust			
Approach I Scan				
SMP CHG POS C	HG Restart	< Prev Next >		
SMP CHG POS C Approach Auto Semi Man	HG Restart	Out Preset 500.0 µm		
SMP CHG POS C Approach Auto Semi Man Move In Low	HG Restart	Out Preset 500.0 μm Z Volt Autozero		



(3) Sample set.

Upset the cantilever holder while catching the handles and put the sample on the stage.





Cantilever holder / Stage FRAGILE

3. Sample Set

(4) Close the noise-proof cover.



(5) Click [Next >].

Easy Menu		×
Init .Set	Sample set	1. Remove the optical
Scan prep	Cantilever set	head and cantilever holder.
Scan PRM	Laser adjust	to the safe position.
Approach		 Adjust the measurement place on the sample to the
Scan		center of the CCD image.
SMP CHG POS CHO	G Restart	< Prev Next >
1 Approach		8
Auto Semi Manua	al Up/Down	Out Preset 500.0 µm
Move In Low	High	Z Volt Autozero
Move Out Low	High	Auto Scan 🗌 Auto Retract

4. Selection of cantilever Easy Menu 23 Select the cantilever type. Init .Set Sample set 1. Place the cantilever on the cantilever mount. Scan prep 2. Install the cantilever Cantilever set holder onto the unit. 3. Choose the parameter table Scan PRM [Self-sens. PRC-DF-40P] Laser adjust for the installed cantilever. 4. Align the cantilever to the Approach location on the sample you wish to scan. Scan < Prev Next > SMP CHG POS CHG Restart 1 Approach 23 Auto Semi Manual Up/Down 500.0 µm Out Preset Move In Low High Z Volt Autozero Setup Console Move Out Low High Auto Scan Auto Retract Scanner Table 23 Cantilever Type PZT_X PZT_Y PZT Z Name Cantilever SI-DF40P2 63.000 Change 20um(Nanocute) 63.000 4.511 -Quit nm/V nm/V nm/V Config... Lever Table kt f0 Name kz Length Tip Sensing Type 500.00 120.00 12 Self-sens, PRC-DF40P 40.00 1.00 8.00 Self 631.50 88.00 100.00 6 Rect Wide40 Leng100 0.75 2.80 Optical 450.00 7 DFM 3N/m 3.00 100.00 33.00 10.00 Optical 8 DFM 20N/m 225.00 20.00 100.00 150.00 10.00 Optical 9 DFM 40N/m 40.00 100.00 140.00 10.00 300.00 Optical 10 ST-AF01 0.10 450.00 10.00 Ontical 0.14 12.00 11 SI-DF3-R 25.00 1.00 100.00 450.00 4.00 Optical 12 Self-sens, PRC-DF40P 1.00 500.00 120.00 8.00 Self 40.00 13 AN2-200 5.00 2000.00 60.00 200.00 5.00 Optical 14 AN2-300 1500.00 30.00 300.00 1.00 5.00 Optical 15 SI-MF20 20.00 (100.00)130.00 225.00 10.00 Optical

5. Scan parameter

Select the scan parameter.



Contact level

Hard	Amplitude ref. : large
Standard	Amplitude ref. : middle
Soft	Amplitude ref. : small

Roughness

Rough	~ 100 nm	
Standard	~ 10 nm	
Flat	~ 1 nm	

Softness

Hard	semiconductor, glass	
Standard	metal	
Soft	polymer, resin	

Scan parameters set

1µm

256

256

Apply

Data

Pixels

Scan Area

Topo, (Servo) Phase Friction Deflection

Image Quality

Contact Level

Roughness

Softness

-

-

-

Registed PRM

Standard

Standard

Standard

Standard

Prev. set PRM

23

-

This time PRM

Press the [This time PRM].

Lines Q-curve console is displayed, \rightarrow diagnostic parameters are defined, and Reset all parameters are automatically adjusted so that the vibration frequency parameter is optimized.



7. Approach

×

OK

After Q-curve adjustment, press the [Approach].

 \rightarrow When the approach completed normally, the PZT voltage is monitored around -30V.



8. Monitor Window



(2) Monitor console (cross-sectional shape).



Increase [I Gain], [P Gain] Reduce [Scan Speed] Reduce [Amp. Ref.]

Reduce [I Gain], [P Gain] Increase [Scan Speed] Increase [Amp. Ref.]

(3) Adjust each parameter.

Scan Cons	sole				23
F	Gather Con	tinue 🗖 🛛	Monitor 🗖 🕄	Serve Hold	🗌 Stop Data 🔺
Ctort	Zoom	Monitor	Win. Mu	ilti Func.	Ouit
June	Center	Select/F	Regist	Simple	Quic
Scan Area	999.8 nm	A V	Initialize	Fllow	
File				V Suppres	sses
Comt. 1		A	mp. Ref.	-0.069	
2		S	can Speed	1.08	Hz 🔺 🔻
3		R	otation	0.0	• 47
Scan Mode	2ch. Simul		• Si	canCanvas	
Pixels	256 💌	Rectan	gle Scan 1:	1 🔻	
Lines	256 💌	Display	Size 25	56 💌	
I Gain	0.06667				
P Gain	0.0166				
A Gain	0		SIS Mode	- 1	
S Gain	0		Off 💌	Lift	10 nm
Posiotion X	0.00 nr	m 🛦 🔻		LITC Speed	14 µm/sec
Y	0.00 nr	m 🔺 🔻		Hold Time	0.0 msec
Bias	0.000 V		Data Type	Topo.(Se	rvo) 🔻
Auto	On	•	LPF	1.000	kHz 🛦 🔻
Auto Tilt	Off	•	HPF	0.000	Hz 🛦 🔻
P Gain LPF	0.500 kł	Hz 🔺 🔻	Range	1804.40	
AGC Ratio	3.0 %	þ	Offset	0.000	V AV .

Corresponding shape



(1) Start scan [Start].

ſ	🤳 Scan Co	onsole		23
		Gather Continue	🗌 Monitor 🗖 Serve Hold	🗆 Stop Data 🔺
	Start	Zoom Mon	itor Win. Multi Func.	Ouit
		Center Sele	ct/Regist Simple	
$ \land $	Scan Area	999.8 nm 🔺 🔻	Initialize AFllow	
\checkmark	File		VSuppres	ses
	Comt. 1		Amp. Ref0.069	<u>A</u>
	2		Scan Speed 1.08	Hz 🔺 🔻
	3		Rotation 0.0	• <u> </u>
	Scan Mode	2ch. Simul	 ScanCanvas 	
	Pixels	256 💌 Rec	tangle Scan 1:1 🔻	
	Lines	256 💌 Disp	lay Size 256 🔻	
	I Gain	0.06667	Y	
	P Gain	0.0166	V	
	A Gain	0	SIS Mode	
	S Gain	0	V Off V Lift Speed	10 nm
	Posiotion X	(0.00 nm 🛓		14 µm/sec
	١	Y 0.00 nm 🛓	T Hold Time	0.0 msec
	Bias	0.000 v 🔺	Data Type Topo.(Ser	vo) 💌
	Auto	On 💌	LPF 1.000	kHz 🛦 🔻
	Auto Tilt	Off 🗨	HPF 0.000	Hz 🔺 💙
	P Gain LPF	0.500 kHz 🛓	Range 1804.40	nm 🔺 🔻
	AGC Ratio	3.0 %	Offset 0.000	V AV .



- 0 X

-8

(2) After the scan, move out [Preset] twice

1 Approach	8
Auto Semi Manual Up/Down	Out Preset 500.0 µm
Approach	Z Volt Autozero
	🗌 🗆 Auto Scan 🔲 Auto Retract

(1) Select image and save as a raw data (*.XQD)



(2) save as image (*.BMP, *.TIF, *.JPG)



11. End

- (1) Close [Easy Menu].
- (2) Select [Exit (X)] in [Setup (U)] and [Exit].

Exit		×
Save Parameters(Ten	nporary)	Evit
🗆 Scanner Table	🗆 Scan Param.	
Lever Table	Graphics Param.	Cancel
Force Curve	🗖 Stage Param.	
Frictional Curve	🗆 Sample Table	
□ I/V Curve	🗖 Preset Table	
🗖 I/Z Curve	🗖 Impact Stage	
□ Z/V Curve	🗖 EC Param.	
🗆 Q Curve	Window Position	
	🗖 Wafer Header	
	□ Others	

(3) When the [Move Out] is displayed, press the [Stop] immediately.

:	
Stop	
	Stop

(4) Turn off the electric equipment part and PC