This Certification Package relates to the following substrate: **Beamsplitter**

Serial number:BS02 B

The Package consists of the following documents:

1. Printed documents

HABA-LIGO-C–PD:	Certification of Physical Dimensions and Registration Mark location, orientation and dimensions
HABA-LIGO-C-SB:	Certification of Side and Bevel Polish
HABA-LIGO-C-SP:	Certification of Scratches and Point Defects
HABA-LIGO-C-SN:	Certification of Serial Number location, dimensions
HABA-LIGO-C-SF:	Certification of Surface Figure for Sides 1 and 2 and transmitted wave front
HABA-LIGO-C-SL:	Certification of Surface Errors - Low Frequency, for Sides 1 and 2
HABA - LIGO - C - SH:	Certification of Surface Errors - High Frequency, for Sides 1 and 2
Attachment 1	Hard copy print out of LADI data for Side 1 with piston, tilt removed and also for piston, tilt, power, astigmatism removed
Attachment 2A	Hard copy print out of LADI data for Side 2 with piston, tilt, removed and also for piston, tilt, power, astigmatism removed
Attachment 2B	Hard copy print out of LADI data for transmitted wave front in measurement configuration where beam enters through side 2,
Attachment 3	Hard copy printouts of TOPO 2D data obtained with 2.5X and 40X heads at three central positions (side 1)
Attachment 4	Hard copy printouts of TOPO 2D data obtained with 2.5X and 40X heads at three central positions (side 2)

2. Electronic data

Surface maps for sides 1 and 2 are available at the CSIRO ftp site under the following file names:

LADI data	BS_21RR.opd BS_21RR.gif	(Side 1)	BS_22RR.opd BS_22RR.gif BS_2TRR.opd BS_2TRR.gif	(Side 2) (wave front)
TOPO data (2.5x)	T2BS21RRA.asc T2BS21RRA.gif T2BS21RRB.asc T2BS21RRB.gif T2BS21RRC.asc T2BS21RRC.gif	(Side 1)	T2BS22RRA.asc T2BS22RRA.gif T2BS22RRB.asc T2BS22RRB.gif T2BS22RRC.asc T2BS22RRC.gif	(Side 2)
(40X)	T4BS21RRA.asc T4BS21RRA.gif T4BS21RRB.asc T4BS21RRB.gif T4BS21RRC.asc T4BS21RRC.gif		T4BS22RRA.asc T4BS22RRA.gif T4BS22RRB.asc T4BS22RRB.gif T4BS22RRC.asc T4BS22RRC.gif	

1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Physical Dimensions and Registration Mark
4	LIGO specification reference:	D960789-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-PD
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	No
7	CSIRO Log Book Reference	LN0028
8	Team member responsible for measurement/inspection:	Esa Jaatinen
9	Measurement/inspection results reviewed by:	Bob Oreb

10. Results

[Measurement errors (± 1σ) shown only where they are comparable to tolerances specified or when measurement is within 2σ of boundary of acceptability]

Physical Quantity		Result
Diameter		250.97 mm
Cylindricity		0.01 mm
Thickness	(maximum - for FM, RM, ETM) **(minimum for BS)**	39.67 mm
Bevel as per drawing (height, angle):		(S1) Height:2.19 mm Angle: 44^0 42' (S2) Height:2.18 mm Angle: 44^0 48'
Wedge angle:		1^0 0'
Location of registration mark (± angle with respect to minimum part thickness):		+ 4'
Location of other 3 marks (with respect to registration mark at minimum thickness)		90^0 0'; 179^0 59'; 269^0 59'.
Registration mark dimensions (OK/not OK)		OK

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. 5). These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager:  Bob Oreb

Date: 12 NOV 2001

1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Side and Bevel Polish
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SB-A
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	No
7	CSIRO Log Book Reference:	LN00062
8	Team member responsible for measurement/inspection:	Edita Puhanic
9	Measurement/inspection results reviewed d by:	Jeff Seckold

10. Results

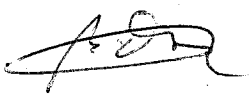
Defects, if any, in the side and bevel polish compared to the LIGO specification (4 above) are detailed below (*team member to note defects here: if none seen, note "no defects observed"*),

Details of scratches and defects which were on the substrate when returned to CSIRO for re-polishing are shown here. No new scratches or defects were introduced by CSIRO as a result of re-polishing.

1. A series of long scratches (up to ~ 40 mm long) along the edge near the bevel and close to the arrowed fiducial.
2. A couple of small scratches and one ~ 4mm long in the area between 90^0 and 180^0 fiducials.
3. A scuff mark near the arrowed fiducial close to S2.
4. A number of small chips on the bevels / chamfers.

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. 5). These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager:  Bob Oreb

Date: 12 Nov. 2001

1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Serial Number and location
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SN-A
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	No
7	CSIRO Log Book Reference:	**Not Certified on re-polish of S1 & S2**
8	Team member responsible for measurement/inspection:	
9	Measurement/inspection results reviewed by:	

10. Results

Quantity inspected	Result of Inspection (OK/not OK)
Location of serial number as per drawing (sec.4)	Not certified
Orientation of serial number as per drawing (sec 4)	Not certified
Height of lettering	Not certified

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. *5).* These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager: Bob Oreb

Date: 12 NOV. 2001

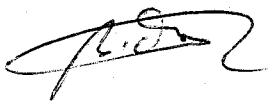
1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Scratches and Point Defects
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SP-A
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	No
7	CSIRO Log Book Reference:	LN00062
8	Team member responsible for measurement/inspection:	Edita Puhanic
9	Measurement/inspection results reviewed by:	Jeff Seckold

10. Results

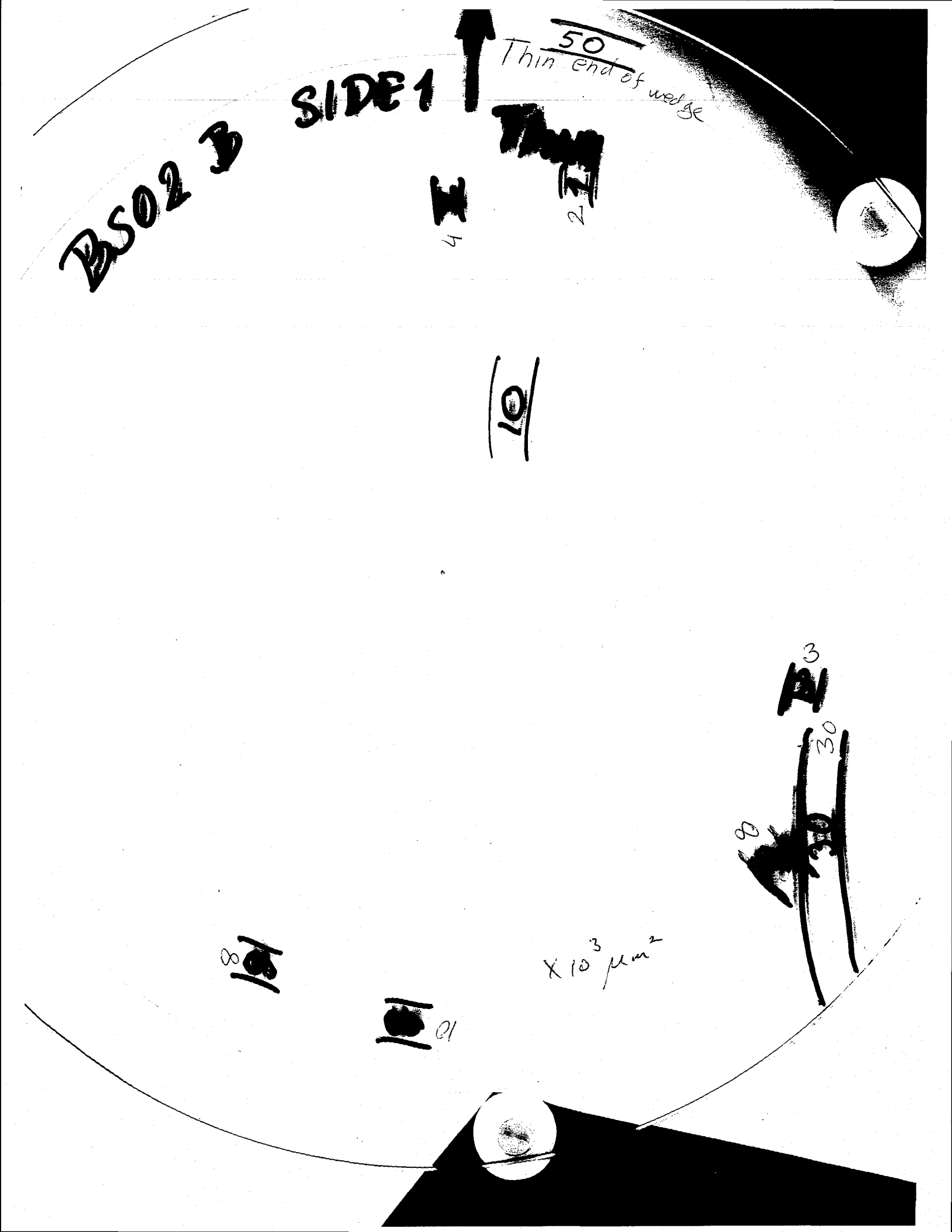
	Numbers of point defects		Total area of scratches (sq.micrometres)	
	Inside central 80mm	Entire surface (235mm)	Inside central 80 mm	Outside central 80mm (235mm)
Surface 1	Nil	Nil	$< 10 \times 10^3$	$< 120 \times 10^3$
Surface 2	Nil	Nil	$< 10 \times 10^3$	$< 30 \times 10^3$

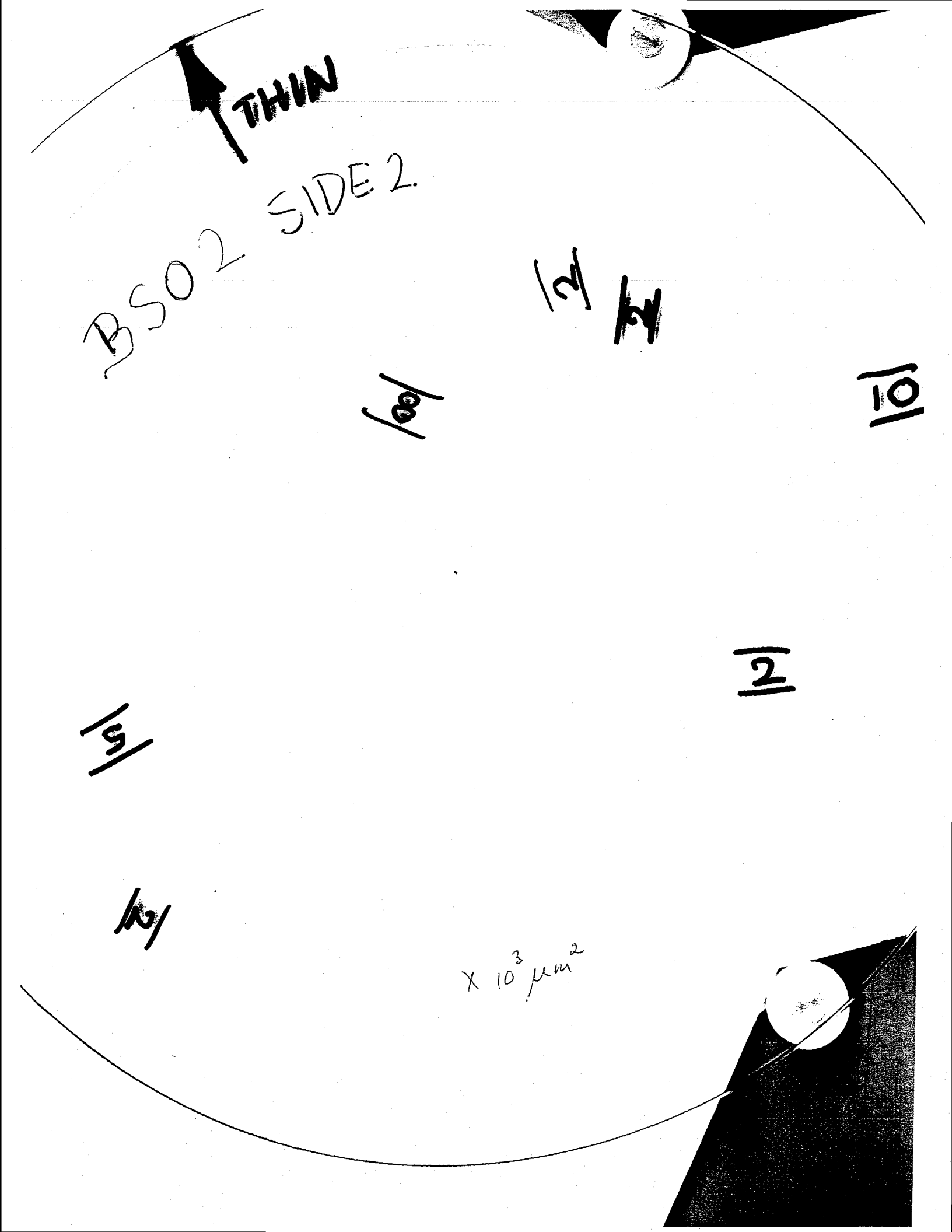
11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. *5).* These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager:  Bob Oreb

Date: 12 NOV. 2001


BS02 3
SIDE 1
50
Thin end of wedge
4
2
10
3
30
0
8
$\times 10^3 \mu m^2$
01


THIN
BSO2 SIDE 2.
14
14
18
10
2
5
12
X 10³ μm²

1	Substrate Type	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Surface Figure
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SF-A
6	CSIRO measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	The measurement of wave front as per E960100-B-D has been replaced by a specification on the wave front transmitted through the substrate, and is calculated as a sum of the measurement on side 1 and the wave front measured as per E960100-B-D (refer CSIRO/Caltech fax correspondence).
7	CSIRO Log Book Reference:	**LN/0332-04, (book 7), p 99**
8	Team member responsible for measurement / inspection:	**Edita Puhanic**
9	Measurement/inspection results reviewed by:	**Bob Oreb**

10. Results

	Radius of Curvature in km (Parabolic sag in nm)	Astigmatism (nm)	Electronic data file
Surface1	> 320 (12.2 nm)	4.8 nm	BS_21RR.opd
Surface 2	>- 134 (- 29.2 nm)	- 16.2 nm	BS_22RR.opd
Wave front*	>- 336 (- 1.7 nm)	- 22.8 nm	BS_2TRR.opd

*Measured as per the test procedure in E960100-B-D. Figure quoted and phase map are for the equivalent of a single pass.

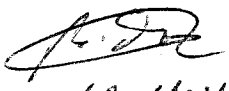
Transmitted wave front (single pass): The parabolic sag equivalent to that of a wave front transmitted through the beam splitter can be found by adding the sag measured for surface 1 to that measured for the single pass-equivalent of a wave front double passing the material after reflection from side 1 (shown in the table above).

The combined sag is **10.5 nm**, which lies within the tolerance band agreed with Caltech of l4nm>Sag>-50nm.

Hardcopies of the phase maps are attached to this certification as part of Attachment 1 for Side 1, Attachment 2A for Side 2 and Attachment 2B for the wave front measured as per E960100-B-D. The phase of the wave front shown in Attachment 2B is equivalent to a single pass measurement. Phase map data is stored in electronic format at the CSIRO ftp site under the filenames shown in the third column.

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. *5),* modified during subsequent discussions and fax correspondence. These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager:  Bob Oreb

Date: 12 Nov. 2001

1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Surface Errors .Low Spatial Frequency
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-3
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SL-A
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	No
7	CSIRO Log Book Reference	LLN/0332-04, (book 7), p 99
8	Team member responsible for measurement/inspection:	Edita Puhanic
9	Measurement/inspection results reviewed by:	Bob Oreb

0 Results

	Low Frequency Surface Errors (nm)	
	80 mm aperture	200 mm aperture
Surface 1	0.7	0.9
Surface 2	0.7	0.8

Hardcopies of the phase maps over the central 200 mm with piston, tilt, power and astigmatism removed are enclosed with this certification in Attachment 1 for Side 1 and Attachment 2 for Side 2.

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec 5). These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager: Bob Oreb

Date: 12 NOV. 2001

1	Substrate Type:	Beamsplitter
2	Serial Number:	BS02 B
3	Physical quantity certified:	Surface Errors .high spatial frequency
4	LIGO specification reference:	E960100-B-D & DCN-E960100-B-D
5	CSIRO measurement/inspection procedure reference:	HABA-LIGO-M-SH-B
6	Variations to the measurement/inspection procedure: (indicate Yes/No and attach separate sheet if Yes)	Data were analysed using PC-based software routines rather than HP-based routines.
7	CSIRO Log Book Reference:	LLN/0332-02; p33-34
8	Team member responsible for measurement/inspection:	Edita Puhanic
9	Measurement/inspection results reviewed by:	Bob Oreb

10. Results

10.1 Surface errors in nanometres averaged over sampling locations within central 80 mm:

Side 1: 0.33

Side 2: 0.36

10.2 Surface errors in nanometres averaged over all sampling locations on surface:

Side 1: 0.34

Side 2: 0.36

10.2 Surface errors in nanometres at different positions A through H on surface:

	A	B	C	D	E	F	G	H
Surface 1	0.32	0.33	0.30	0.35	0.35	0.34	0.33	0.37
Surface 2	0.34	0.35	0.37	0.34	0.41	0.34	0.39	0.37

Two .dimensional surface maps at three central locations are available at the CSIRO ftp site under filenames of the form TMBS0YZRRA.asc, where M is the objective used (M=2 for 2.5X, 4 for 40X), BS is the substrate type, 0Y is the number, Z = 1 or 2 is the side, RR = twice re-polished and A = A, B, C, ... is the sampling position. Hard copies of the data are at Attachment 3 (Side 1) and Attachment 4 (Side 2).

11. Certification

The measurements and inspection data presented in this report were obtained using the procedures outlined in the relevant CSIRO procedures document (sec. *5)*. These results have been reviewed against the LIGO specifications (sec. 4). Taking into account the variations (if any) from these measurement procedures noted in sec.6, CSIRO certifies the substrate to comply with the LIGO specification for this physical quantity.

Project Manager:  Bob Oreb

Date: 12 NOV. 2001

ATTACHMENT - 1

LADI CERTIFICATION DATA

CSIRO

Title: BS_21RR

Date: 11/01/2001

Diameter: 200 mm

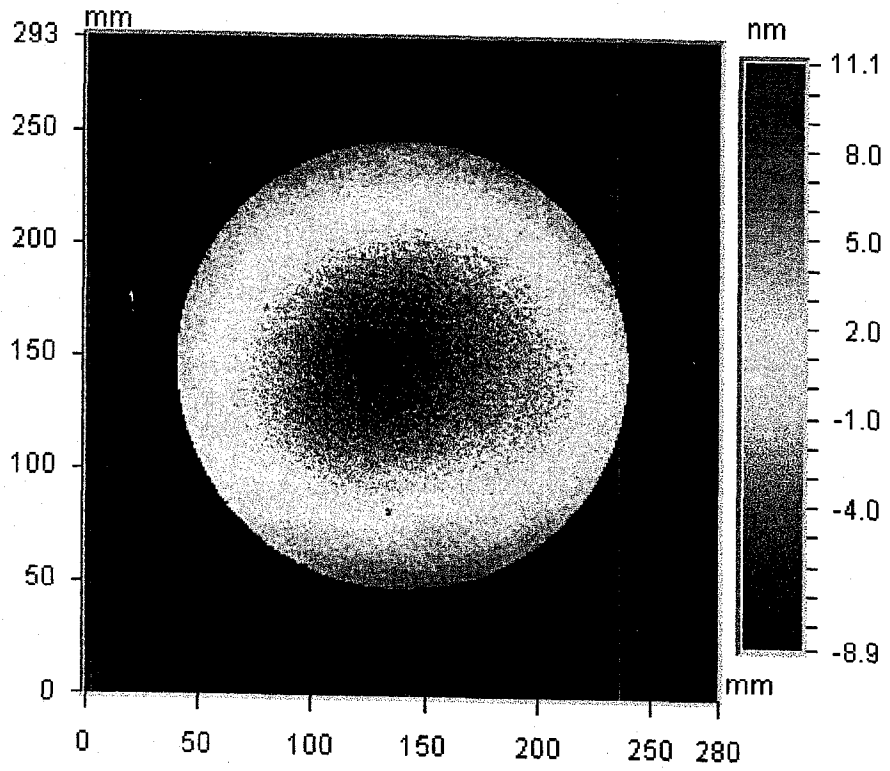
Astig: 4.8 nm

Power: 12.2 nm

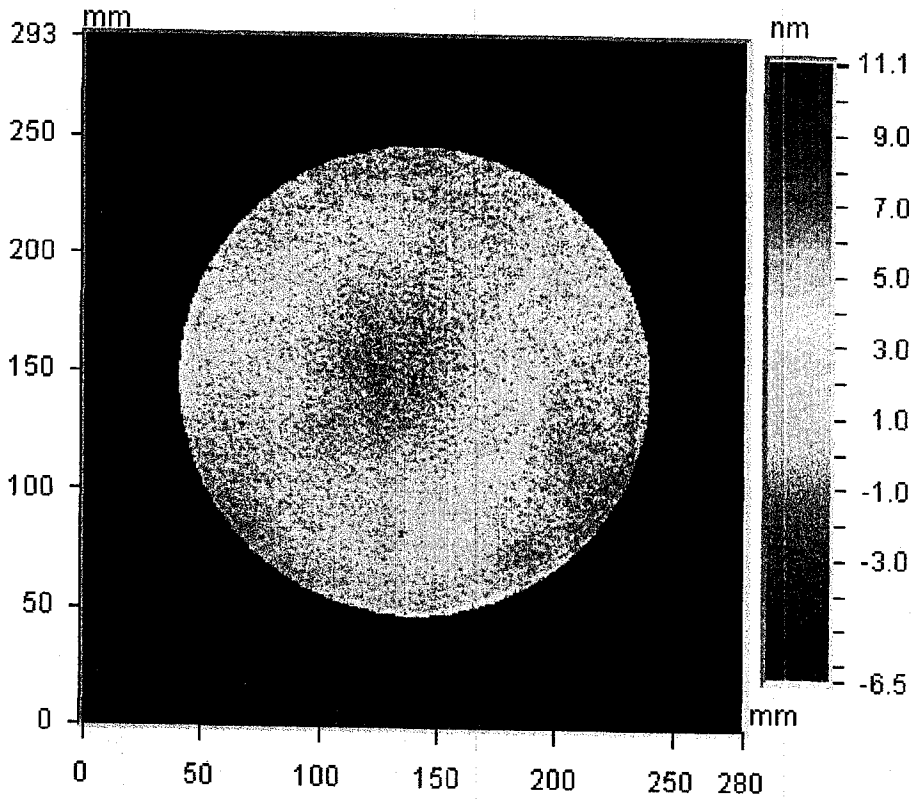
PV: 17.6 nm

RMS: 0.9 nm

Tilt Removed



Tilt/Power/Astig Removed



ATTACHMENT - 2A

LADI CERTIFICATION DATA

CSIRO

Title: BS_22RR

Date: 11/01/2001

Diameter: 200 mm

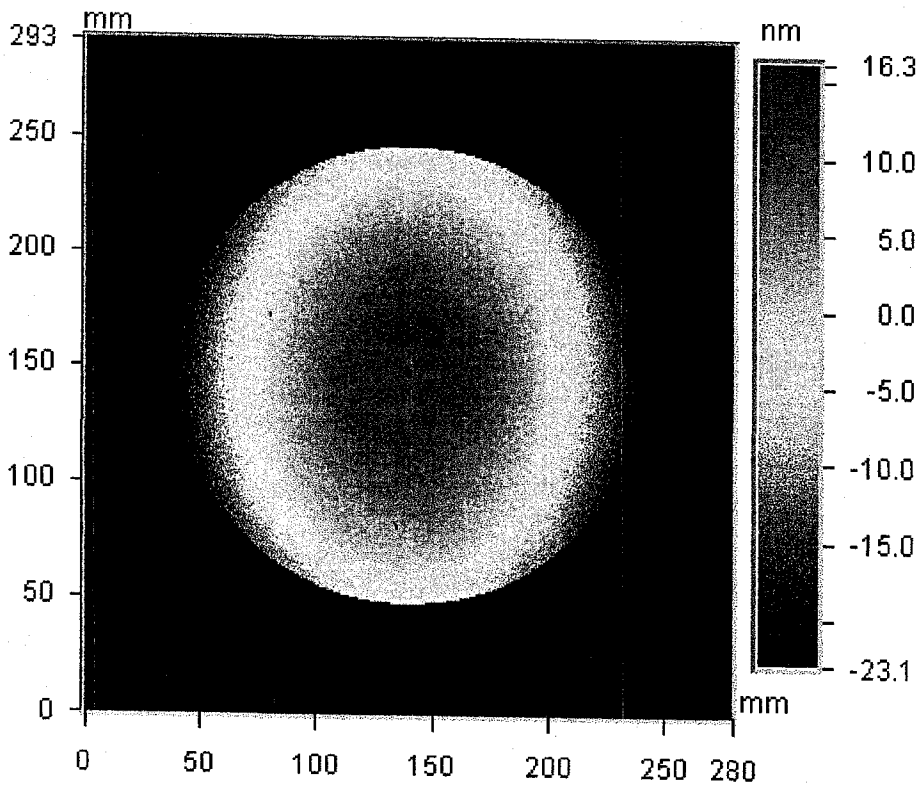
Astig: -16.2 nm

Power: -29.2 nm

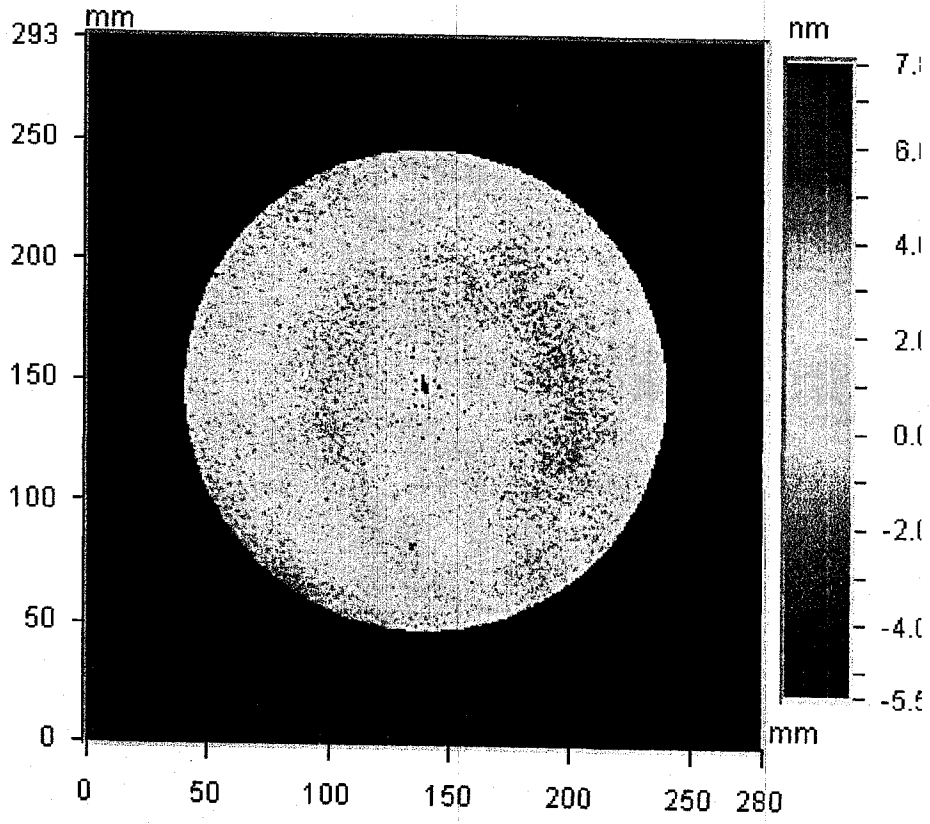
PV: 13.4 nm

RMS: 0.8 nm

Tilt Removed



Tilt/Power/Astig Removed



ATTACHMENT -2B

LADI CERTIFICATION DATA

CSIRO

Title: BS_2TRR

Date: 11/02/2001

Diameter: 200 mm

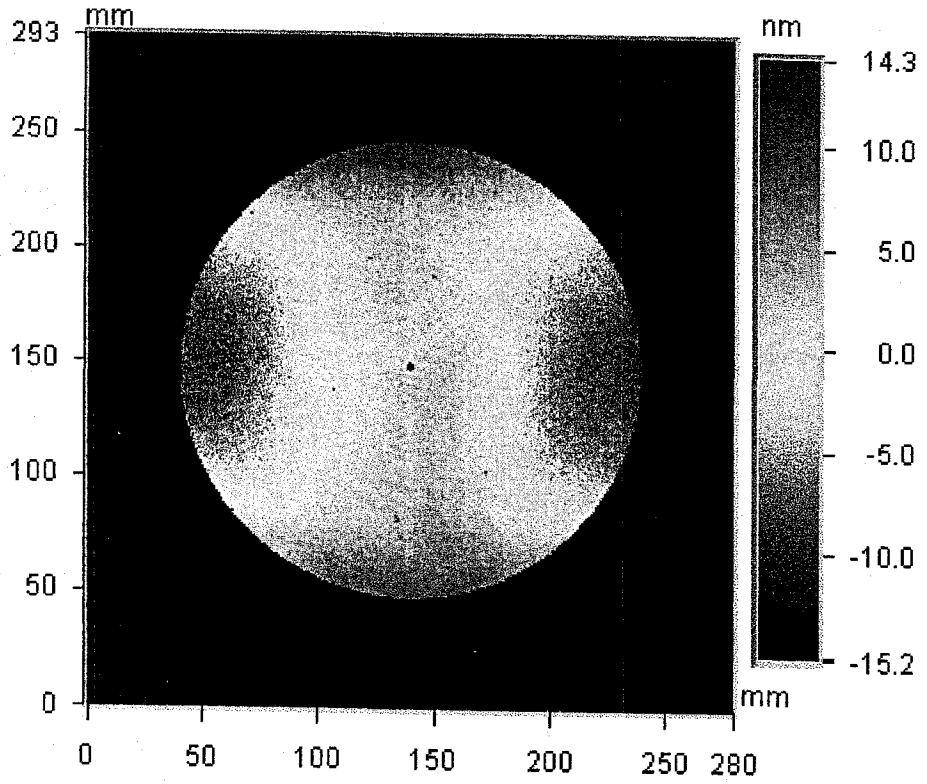
Astig: -22.8 nm

Power: -1.7 nm

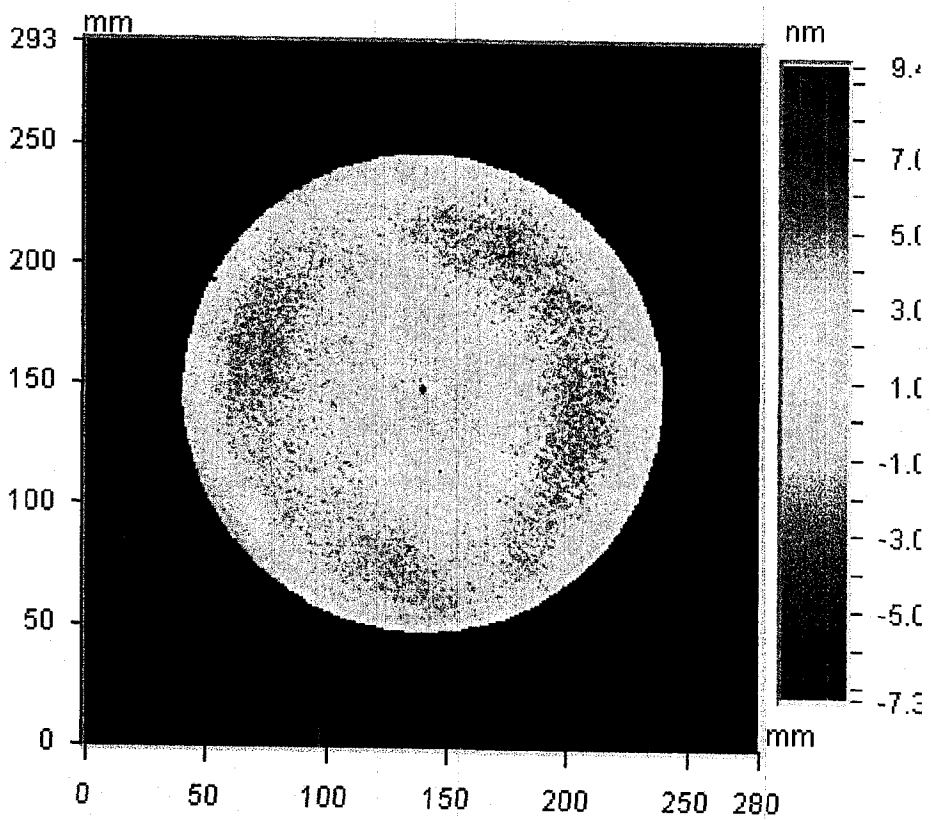
PV: 16.7 nm

RMS: 1.4 nm

Tilt Removed



Tilt/Power/Astig Removed



ATTACHMENT-3(1)

Date: 11/02/2001

Time: 11:31:24

PC TOPO-2D

Veeco

Ra: 1.92 A

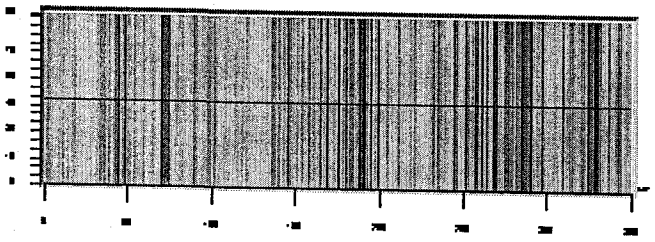
Rq: 2.42 A

Rt: 16.93 A

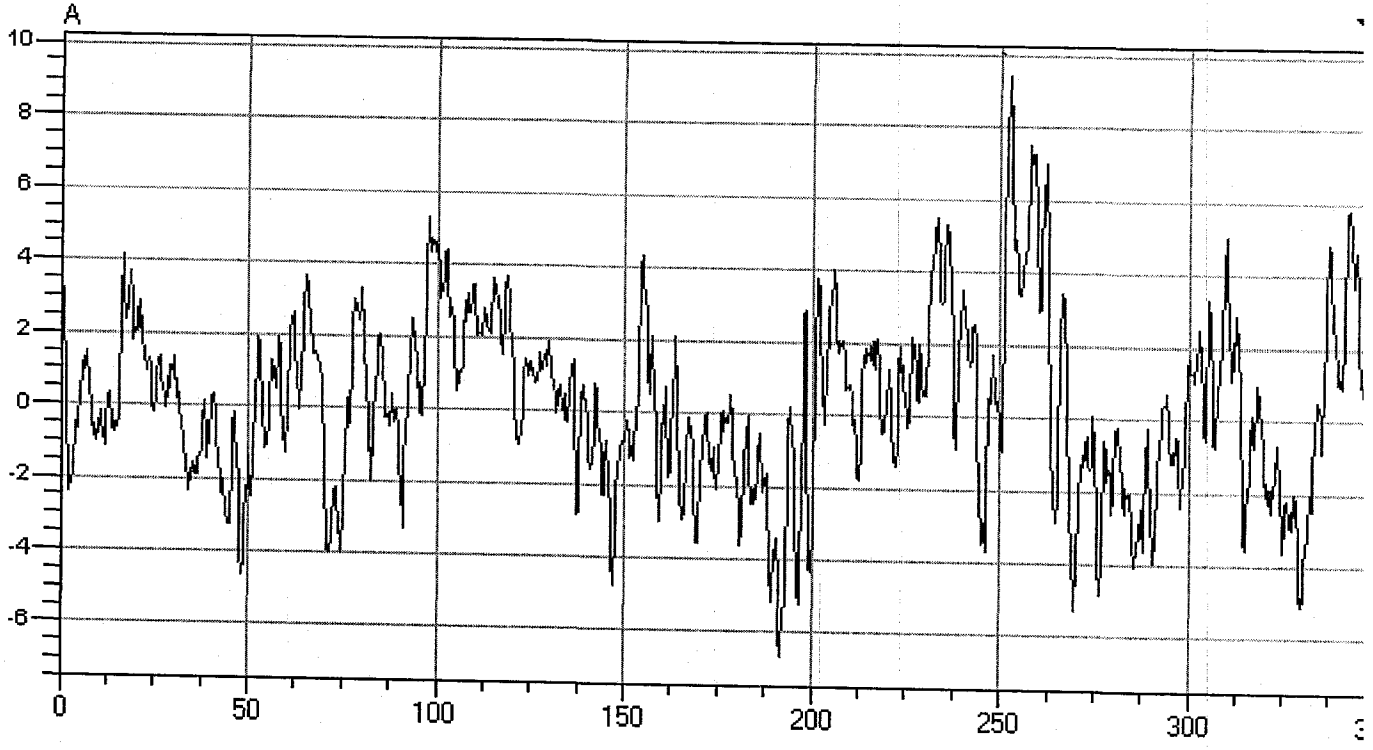
Rz: 13.79 A

Rsk: 0.25

Rku: 3.23



X Profile



Rq	2.41 A
Ra	1.92 A
Rt	16.15 A
Rp	9.43 A
Rv	-6.72 A

Angle	-1.02 ura
Curve	2.89 km
Terms	None
Avg Ht	0.25 A
Area	0.01 um

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS21RRA

Note: 40X, BS21

ATTACHMENT - 3(2)

Date: 11/02/2001

Time: 11:38:59

PC TOPO-2D

Veeco

Ra: 2.01 A

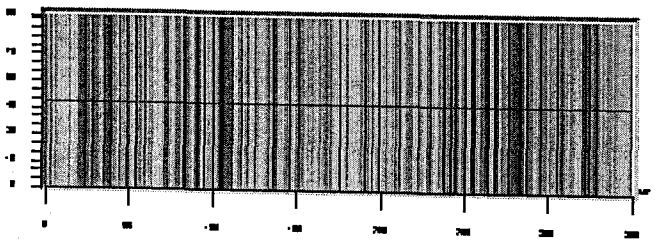
Rq: 2.49 A

Rt: 14.18 A

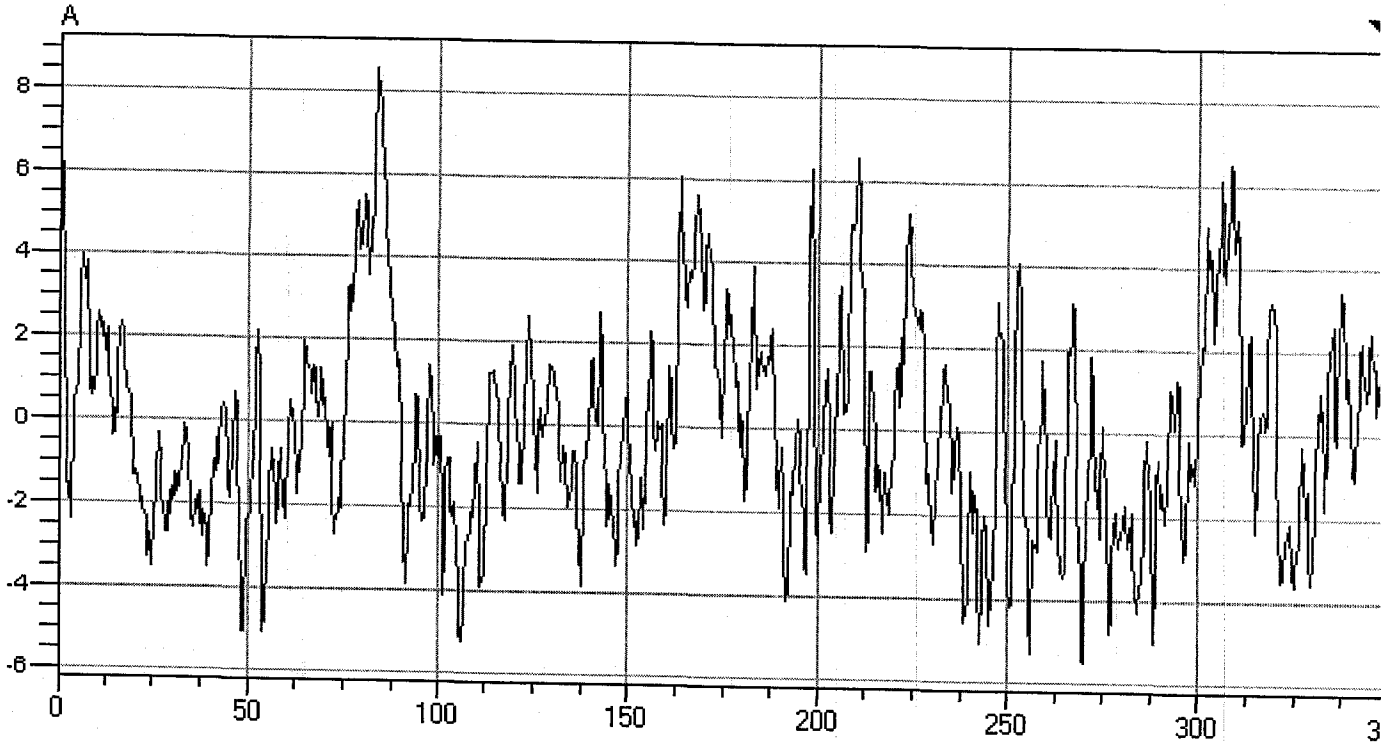
Rz: 12.49 A

Rsk: 0.50

Rku: 3.00



X Profile



Rq	2.49 A
Ra	2.01 A
Rt	14.15 A
Rp	8.60 A
Rv	-5.54 A

Angle	-2.75 ura
Curve	-3.21 km
Terms	None
Avg Ht	-0.02 A
Area	-0.00 um

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS21RRB

Note: 40X, BS21

ATTACHMENT - 3(3)

Date: 11/02/2001

Time: 14:31:20

PC TOPO-2D

Veec

Ra: 1.84 A

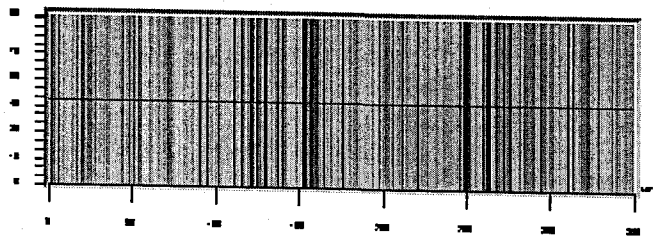
Rq: 2.31 A

Rt: 14.65 A

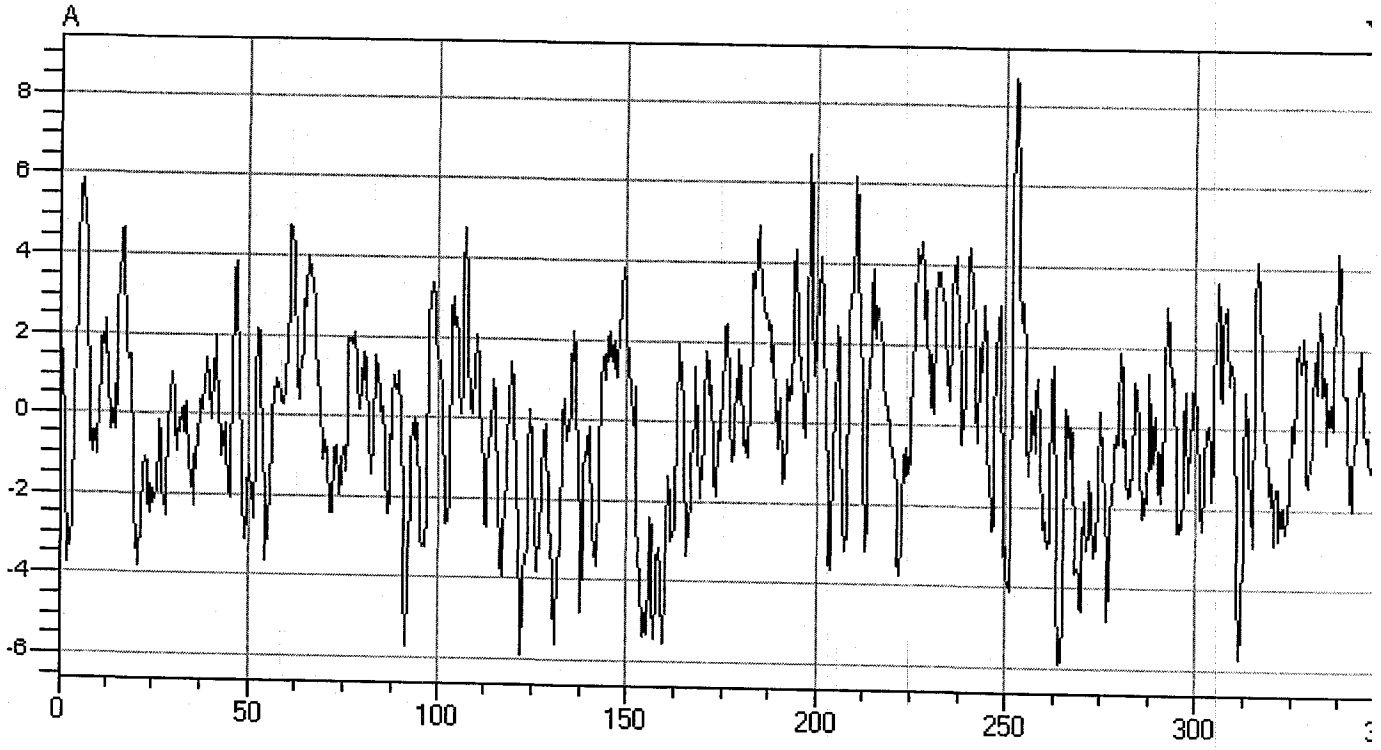
Rz: 12.92 A

Rsk: 0.10

Rku: 3.05



X Profile



Rq	2.31 A
Ra	1.84 A
Rt	14.64 A
Rp	8.69 A
Rv	-5.94 A

Angle	-1.25 ura
Curve	24.70 km
Terms	None
Avg Ht	-0.00 A
Area	-0.00 um

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS21RRC

Note: 40X, BS21

ATTACHMENT -3(A)

Date: 10/31/2001

Time: 09:30:57

PC TOPO-2D

Veeco

Ra: 2.27 A

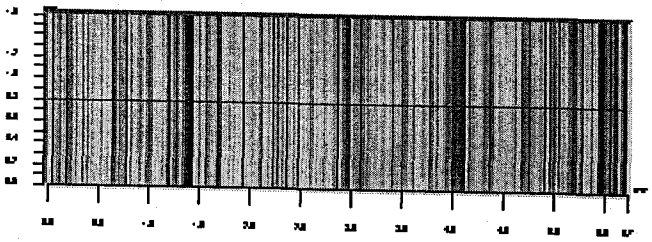
Rq: 2.75 A

Rt: 13.73 A

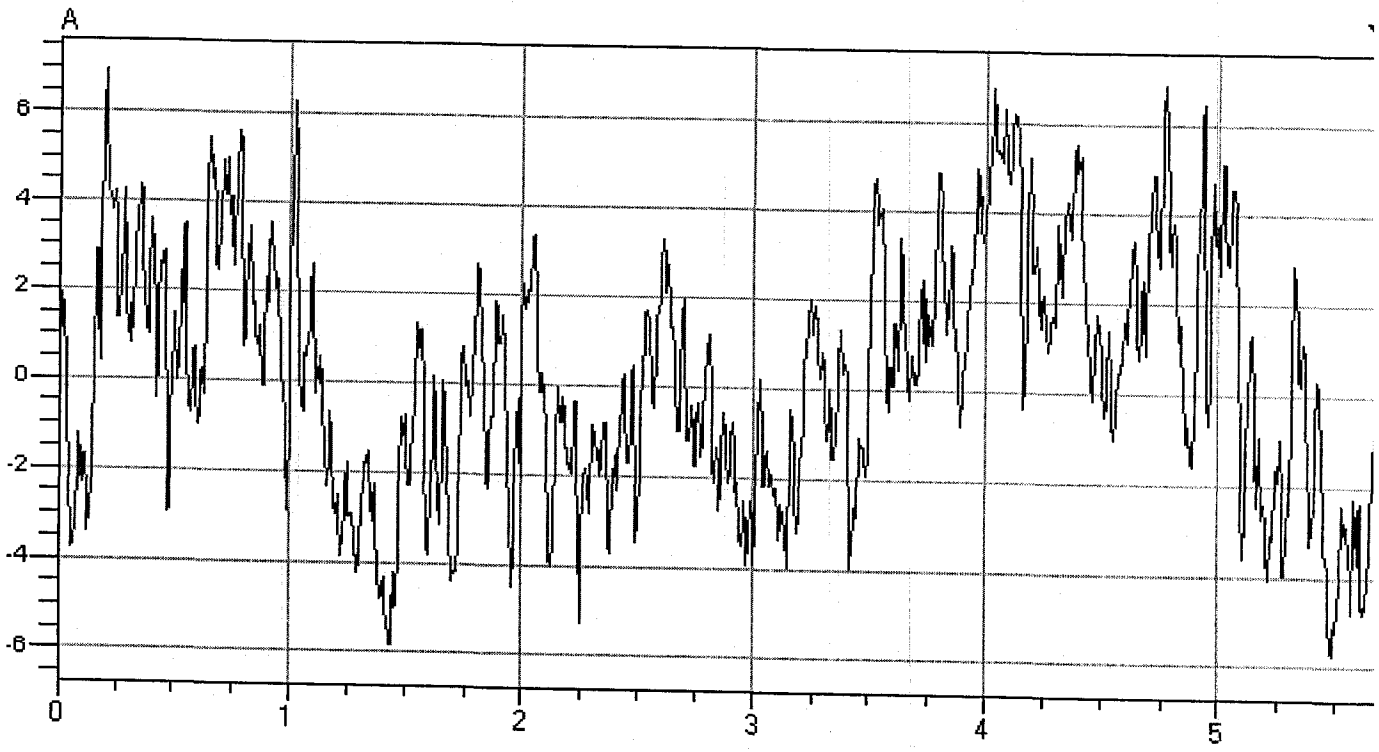
Rz: 12.87 A

Rsk: 0.11

Rku: 2.35



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS21RRA

Note: 2.5X, BS21

Rq	2.74 A
Ra	2.27 A
Rt	13.08 A
Rp	6.95 A
Rv	-6.13 A

Angle	-0.11 ura
Curve	888.74 km
Terms	None
Avg Ht	0.20 A
Area	0.11 um

ATTACHMENT - 3(5)

Date: 10/31/2001

Time: 09:39:53

PC TOPO-2D

Veeco

Ra: 1.98 A

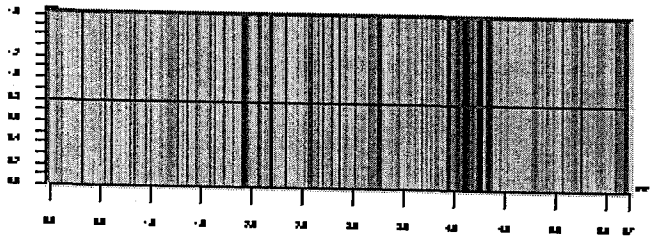
Rq: 2.49 A

Rt: 14.51 A

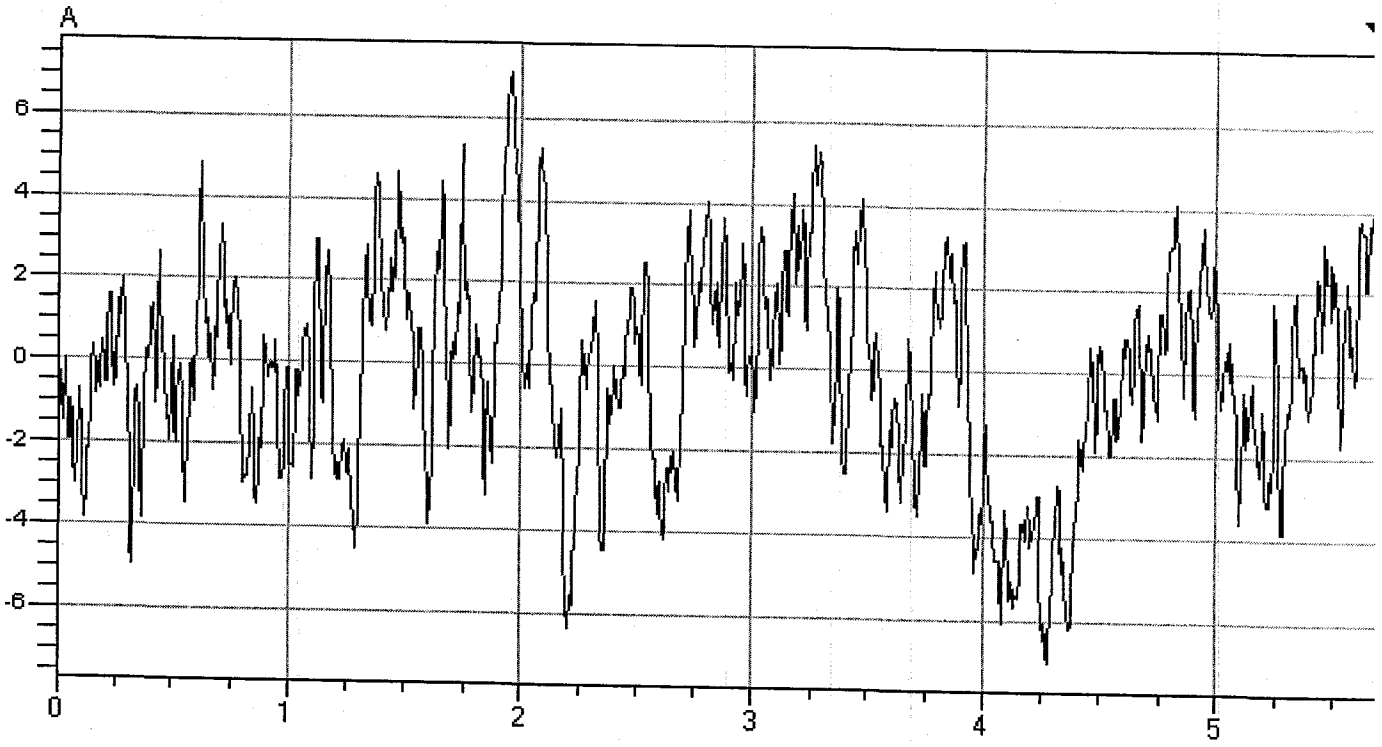
Rz: 12.55 A

Rsk: -0.14

Rku: 2.82



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS21RRB

Note: 2.5X, BS21

Rq	2.49 A
Ra	1.98 A
Rt	14.21 A
Rp	7.13 A
Rv	-7.08 A

Angle	0.06 ura
Curve	-
Terms	None
Avg Ht	-0.09 A
Area	-0.05 um

ATTACHMENT - 3(6)

Date: 10/31/2001

Time: 09:41:44

PC TOPO-2D

Veeco

Ra: 2.05 A

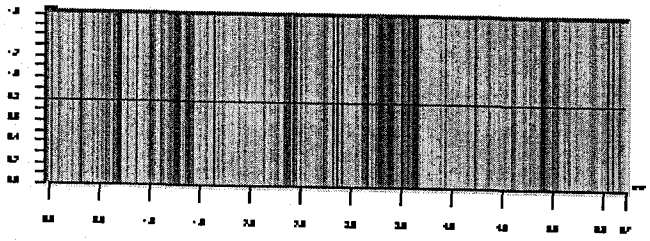
Rq: 2.54 A

Rt: 15.28 A

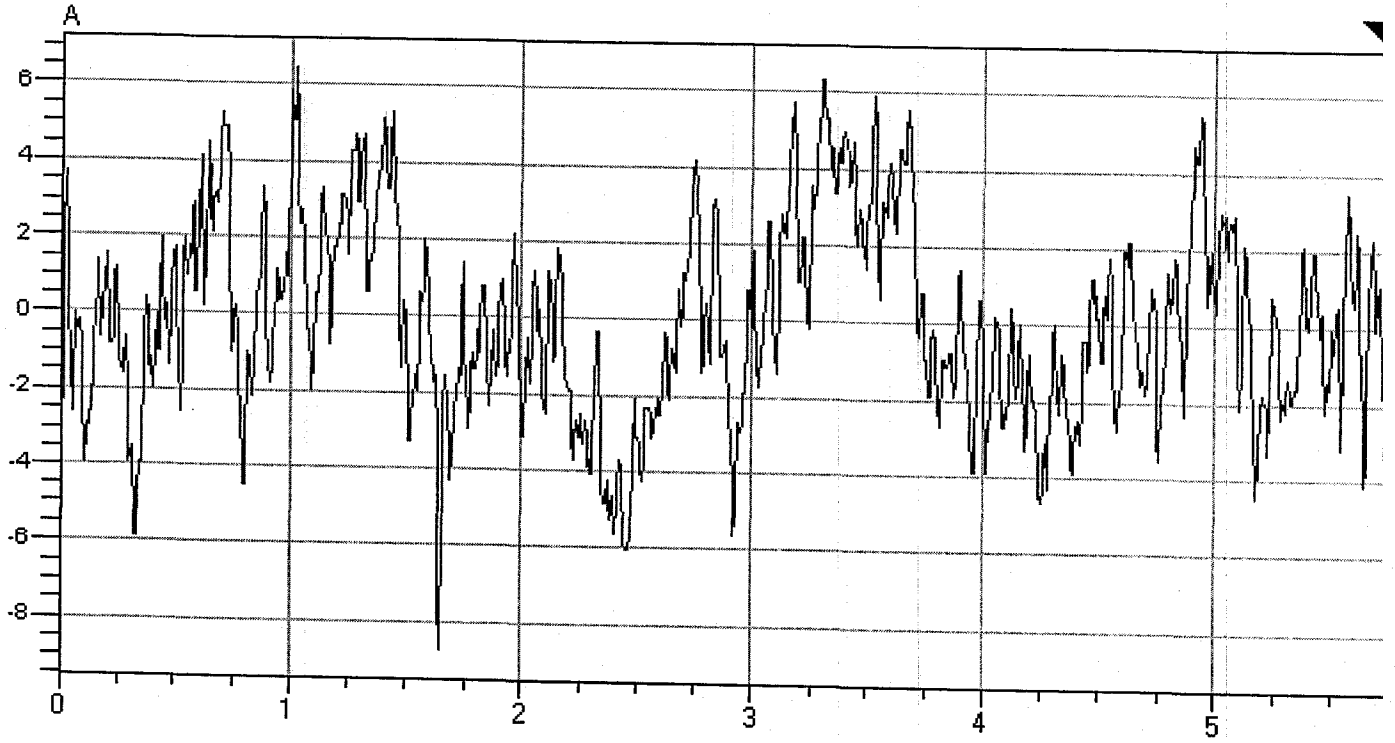
Rz: 12.98 A

Rsk: 0.13

Rku: 2.69



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS21RRC

Note: 2.5X, BS21

Rq	2.54 A
Ra	2.05 A
Rt	15.28 A
Rp	6.47 A
Rv	-8.80 A

Angle	-0.01 urac
Curve	-
Terms	None
Avg Ht	0.00 A
Area	0.00 um2

ATTACHMENT-4(1)

Date: 11/05/2001

Time: 10:12:32

PC TOPO-2D

Veeco

Ra: 2.14 A

Rq: 2.64 A

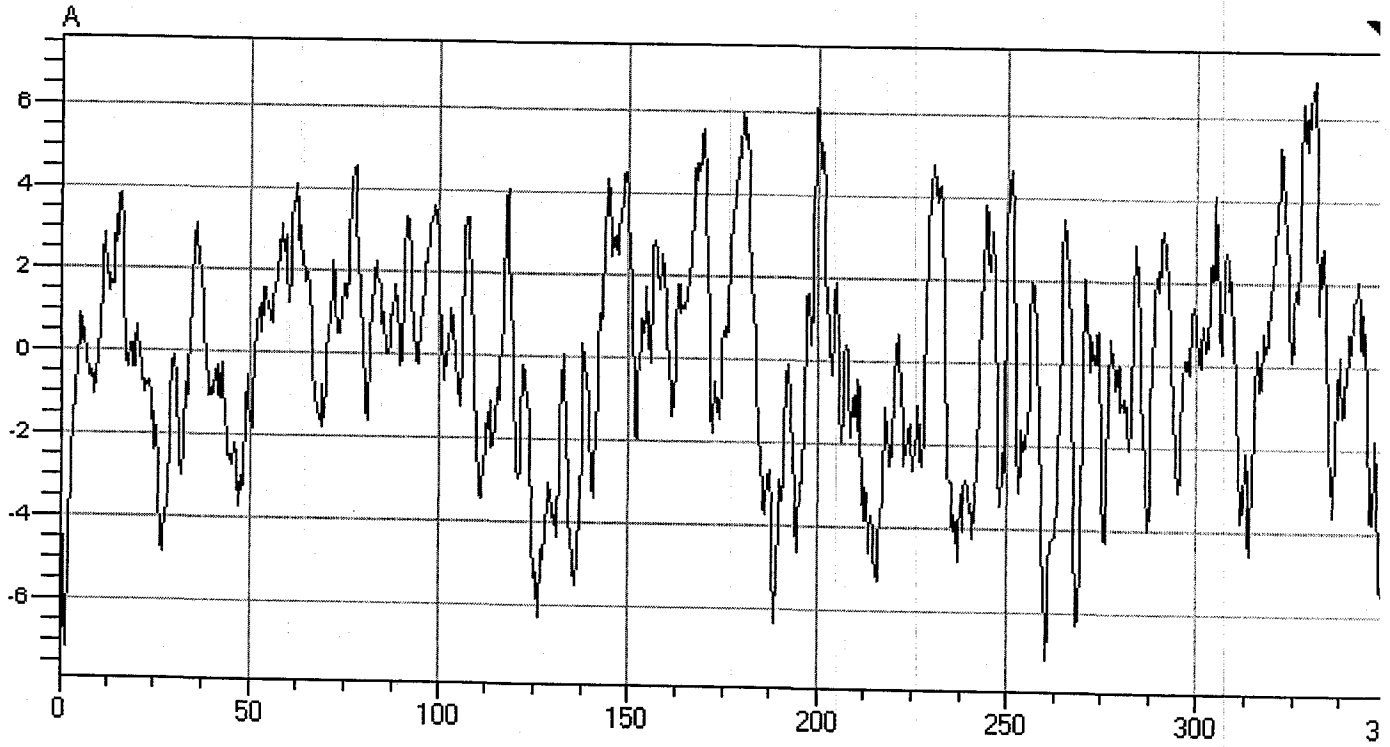
Rt: 14.23 A

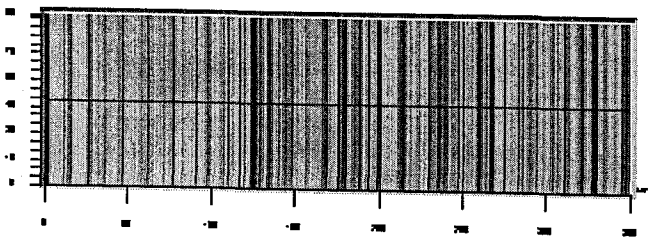
Rz: 13.25 A

Rsk: -0.05

Rku: 2.60

X Profile





Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS22RRA

Note: 40X, BS22

Rq	2.64 A
Ra	2.14 A
Rt	14.09 A
Rp	6.90 A
Rv	-7.19 A

Angle	0.18 ura
Curve	-6.99 km
Terms	None
Avg Ht	-0.06 A
Area	-0.00 um

ATTACHMENT - 4(2)

Date: 11/05/2001

Time: 10:20:18

PC TOPO-2D

Veeco

Ra: 2.08 A

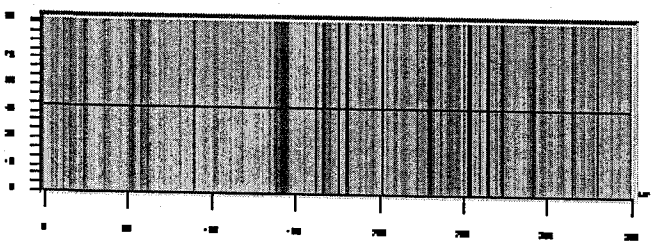
Rq: 2.61 A

Rt: 18.79 A

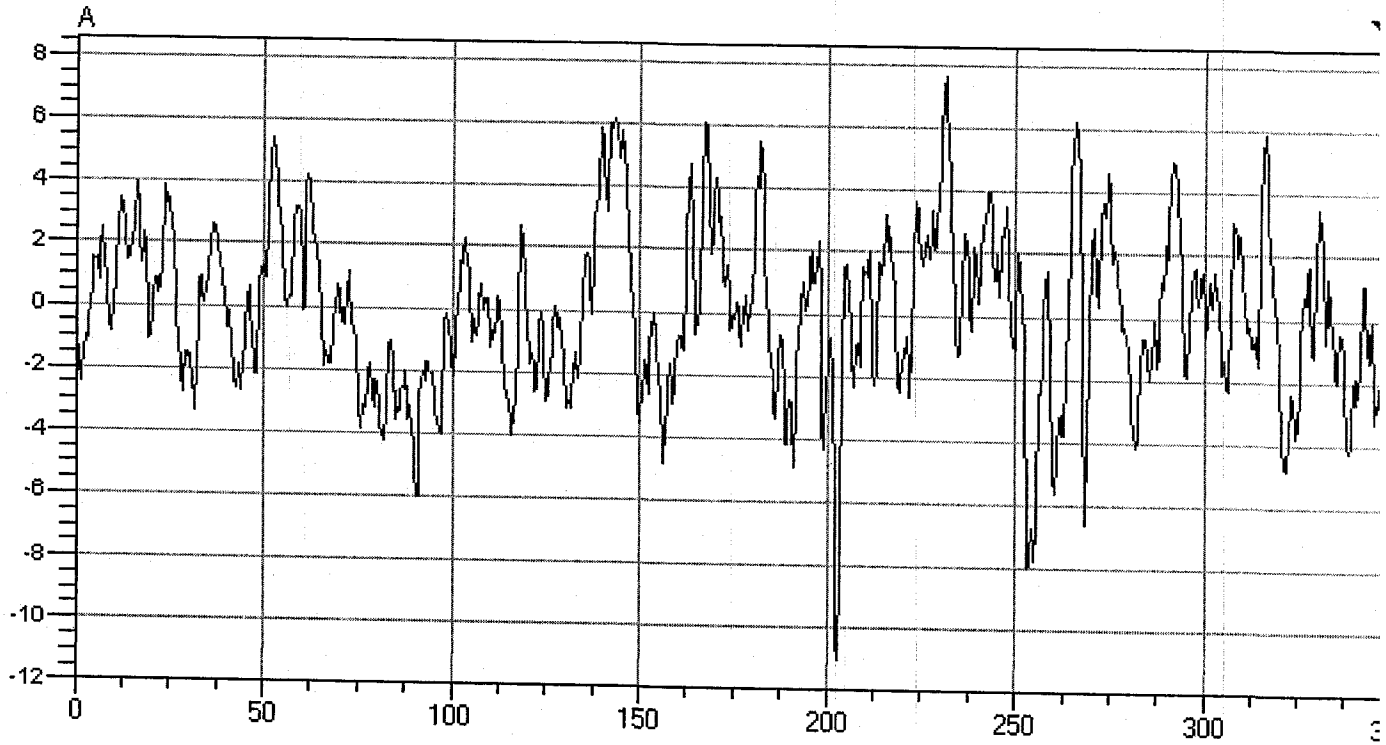
Rz: 15.08 A

Rsk: -0.06

Rku: 3.43



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS22RRB

Note: 40X, BS22

Rq	2.61 A
Ra	2.07 A
Rt	18.73 A
Rp	7.65 A
Rv	-11.08 A

Angle	0.84 ura
Curve	4.87 km
Terms	None
Avg Ht	0.02 A
Area	0.00 um

ATTACHMENT - 4(3)

Date: 11/05/2001

Time: 11:00:41

PC TOPO-2D

Veec

Ra: 2.34 A

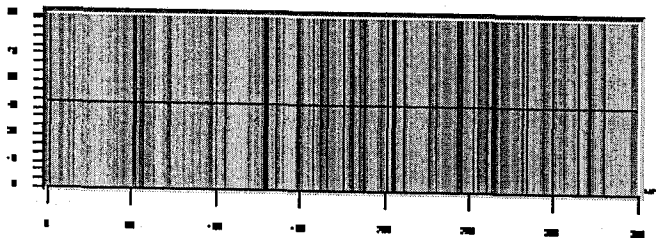
Rq: 2.91 A

Rt: 16.71 A

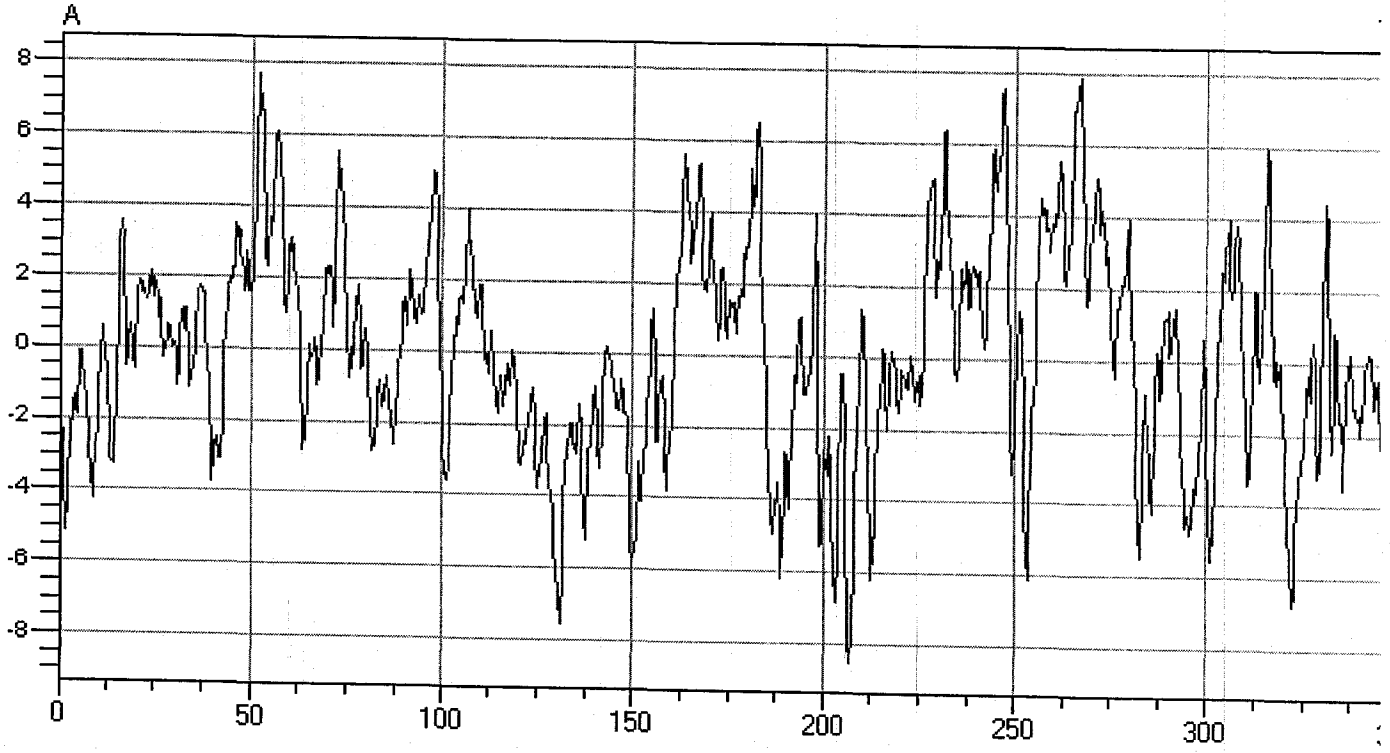
Rz: 15.25 A

Rsk: -0.03

Rku: 2.81



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: T4BS22RRC

Note: 40X, BS22

Rq	2.91 A
Ra	2.34 A
Rt	16.48 A
Rp	7.91 A
Rv	-8.57 A

Angle	0.82 ura
Curve	2.99 km
Terms	None
Avg Ht	0.08 A
Area	0.00 um

ATTACHMENT - 4(4)

Date: 10/31/2001

Time: 14:25:15

PC TOPO-2D

Veeco

Ra: 2.14 A

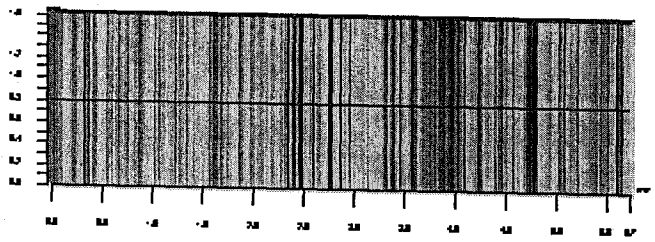
Rq: 2.65 A

Rt: 15.08 A

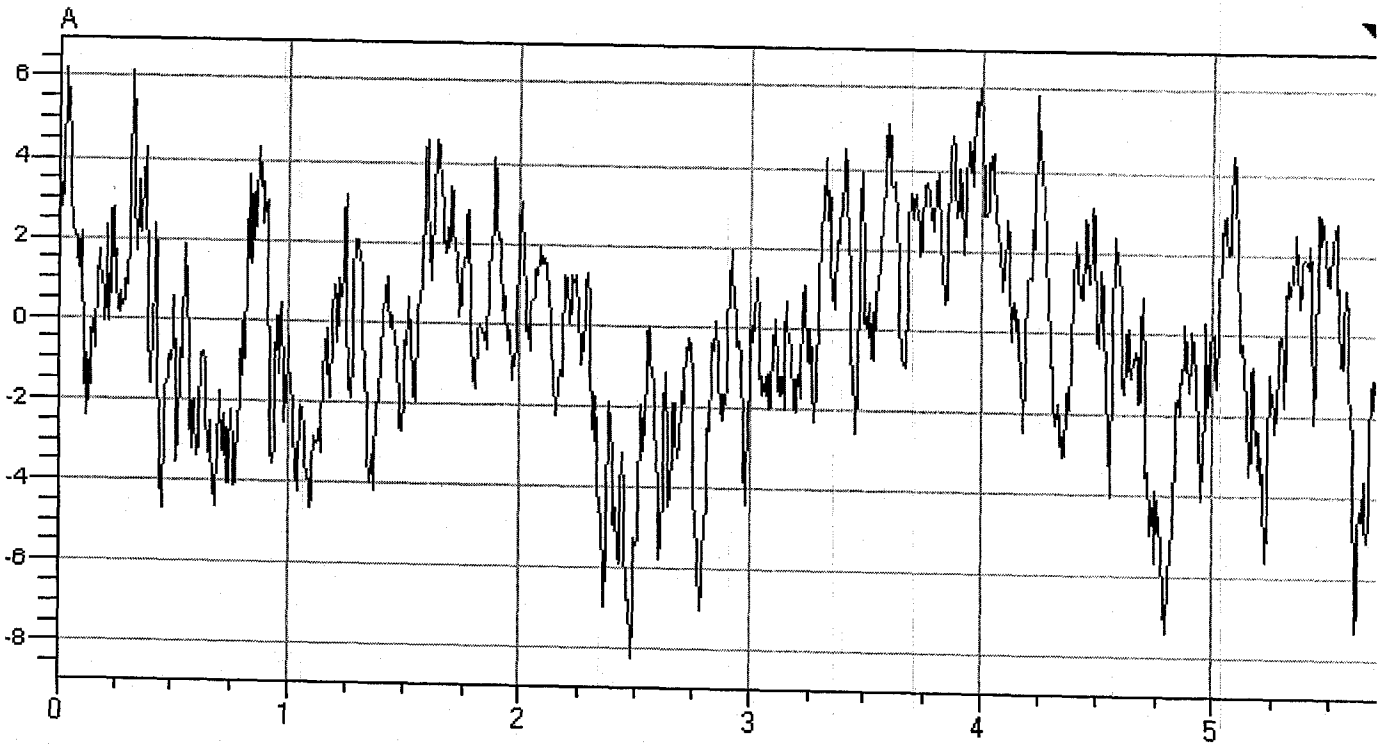
Rz: 13.91 A

Rsk: -0.21

Rku: 2.77



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS22RRA

Note: 2.5X, BS22

Rq	2.64 A
Ra	2.13 A
Rt	14.47 A
Rp	6.21 A
Rv	-8.26 A

Angle	-0.08 urad
Curve	-916.99 km
Terms	None
Avg Ht	-0.18 A
Area	-0.11 um2

ATTACHMENT - 4(5)

Date: 10/31/2001

Time: 15:19:33

PC TOPO-2D

Veeco

Ra: 2.26 A

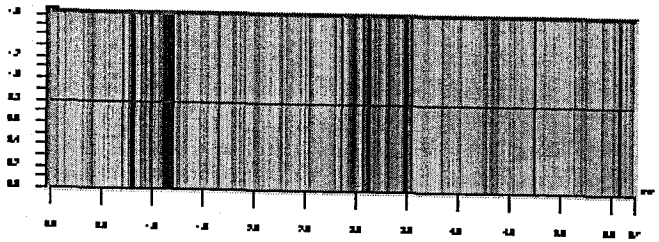
Rq: 2.81 A

Rt: 16.82 A

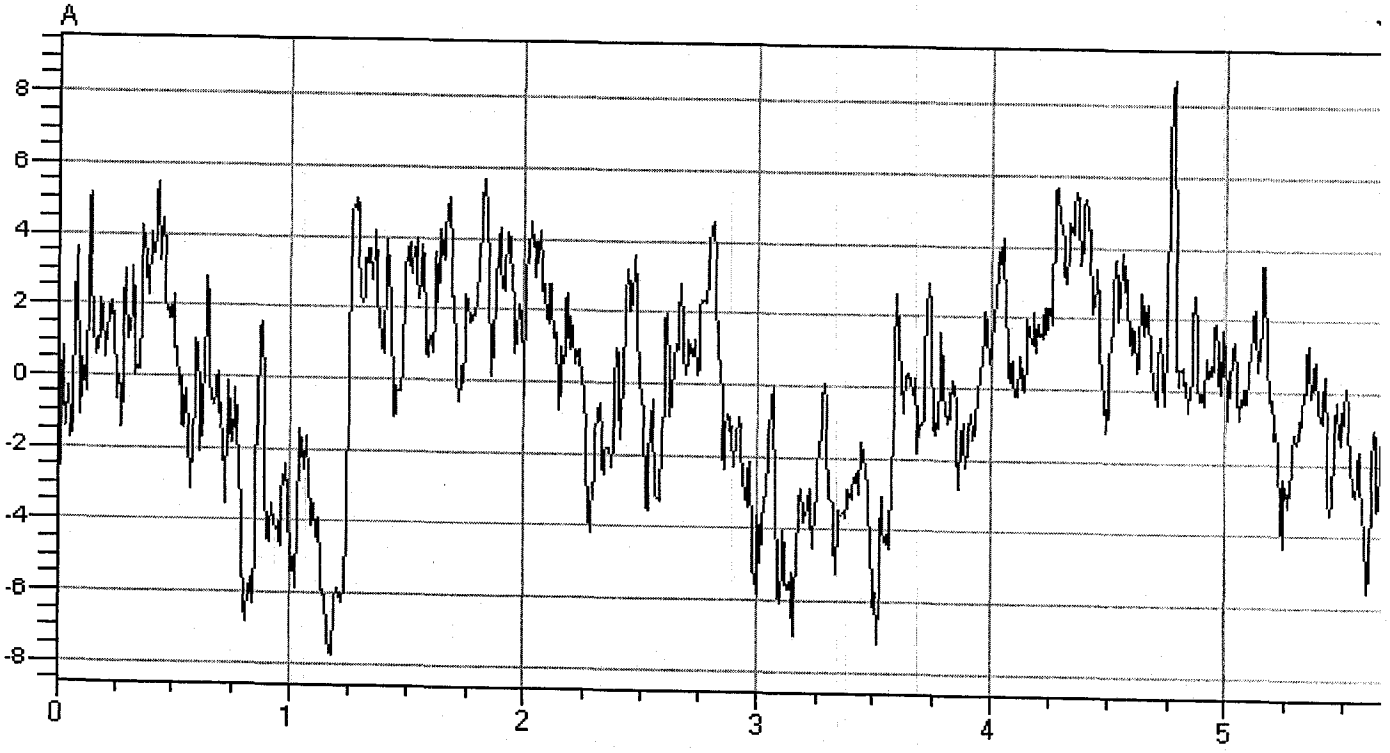
Rz: 13.95 A

Rsk: -0.26

Rku: 2.73



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS22RRB

Note: 2.5X, BS22

Rq	2.81 A
Ra	2.26 A
Rt	16.57 A
Rp	8.74 A
Rv	-7.83 A

Angle	-0.02 ura
Curve	-
Terms	None
Avg Ht	-0.08 A
Area	-0.05 um

ATTACHMENT - 4(6)

Date: 10/31/2001

Time: 14:41:38

PC TOPO-2D

Veec

Ra: 1.95 A

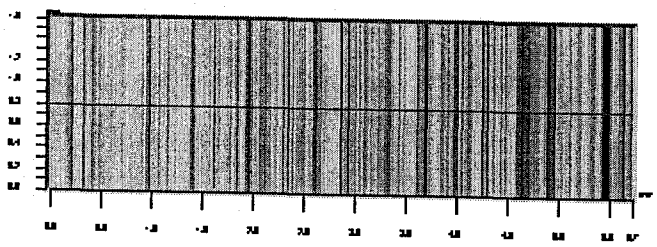
Rq: 2.45 A

Rt: 15.36 A

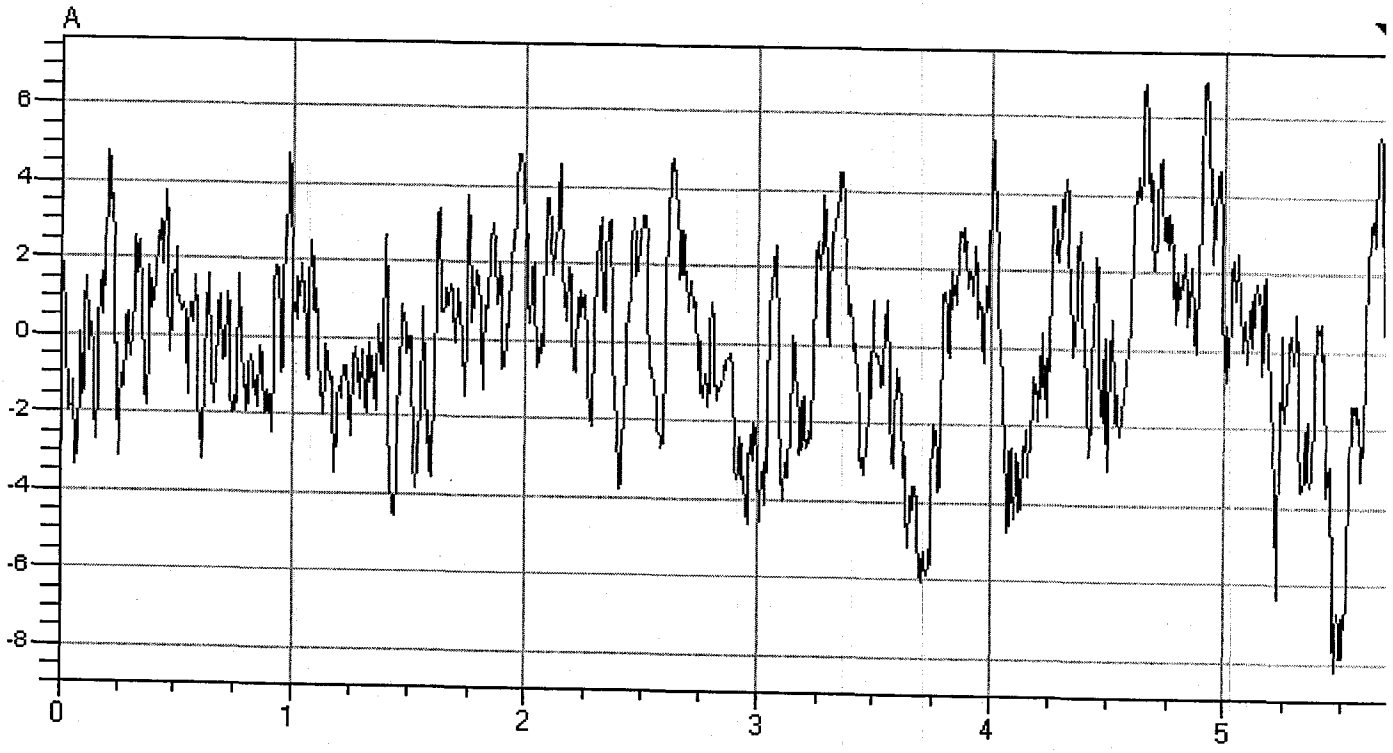
Rz: 13.74 A

Rsk: -0.20

Rku: 3.13



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: T2BS22RRC

Note: 2.5X, BS22

Rq	2.45 A
Ra	1.95 A
Rt	15.17 A
Rp	6.91 A
Rv	-8.26 A

Angle	-0.02 ura
Curve	-
Terms	None
Avg Ht	0.06 A
Area	0.04 um