LIGO-T050085-00-D

X-IronPort-AV: i="3.93,115,1114956000";
  d="opd'?gif'147?scan'147,208,147"; a="38070023:sNHT1061221100"
Subject: RE: 4ITM01
Date: Wed, 18 May 2005 11:37:27 +1000
X-MS-Has-Attach: yes
X-MS-TNEF-Correlator:
Thread-Topic: 4ITM01
Thread-Index: AcVX0Ze60oyJx7S9R0iy312gDoU9fQDdmlhg
From: <Bob.Oreb@csiro.au>
To: <gari@ligo.caltech.edu>
Cc: <ahelena@ligo.caltech.edu>
X-OriginalArrivalTime: 18 May 2005 01:37:28.0467 (UTC) FILETIME=[26AF7E30:01C55B4A]
X-Spam-Score: undef - Domain Whitelisted (csiro.au:)
X-Scanned-By: CanIt (www . roaringpenguin . com) on 131.215.115.14

Dear Gari

We have cleaned both sides of the 4ITM01 and carried out a quick measurement of the surface figure on the LADI. The attached files show the "opd" maps for both sides with Power and Tilt removed while the "gif" files show profile plots along the two opd phase maps. You can see that side 2 looks fairly good and clean however side 1 is full of streaks and artefacts which were not there initially when we delivered the optic to you. The streaks have significant surface relief (all appear positive relief)as you can see in the corresponding gif file for side 1 (typically the peak relief is ~ 4 nm to ~ 8 nm for the streaks and much larger for the two red coloured artefacts or areas). I am not sure what value TOPO measurements will be and at which locations we should do the TOPO measurements. If you still want us to do the TOPO measurements then perhaps you can indicate which specific areas of the phase map you want us to concentrate on.

Regards

Bob

-----Original Message-----
From: gari@ligo.caltech.edu [mailto:gari@ligo.caltech.edu]
Sent: Saturday, 14 May 2005 2:35 AM
To: Oreb, Bob (CIP, Lindfield)
Cc: Billingsley_G@ligo.caltech.edu
Subject: RE: 4ITM01

Hi Bob,
I'm glad you have made it back home safely, I hope the trip went well?
By all means, please do clean 4ITM01. It certainly has sat around here

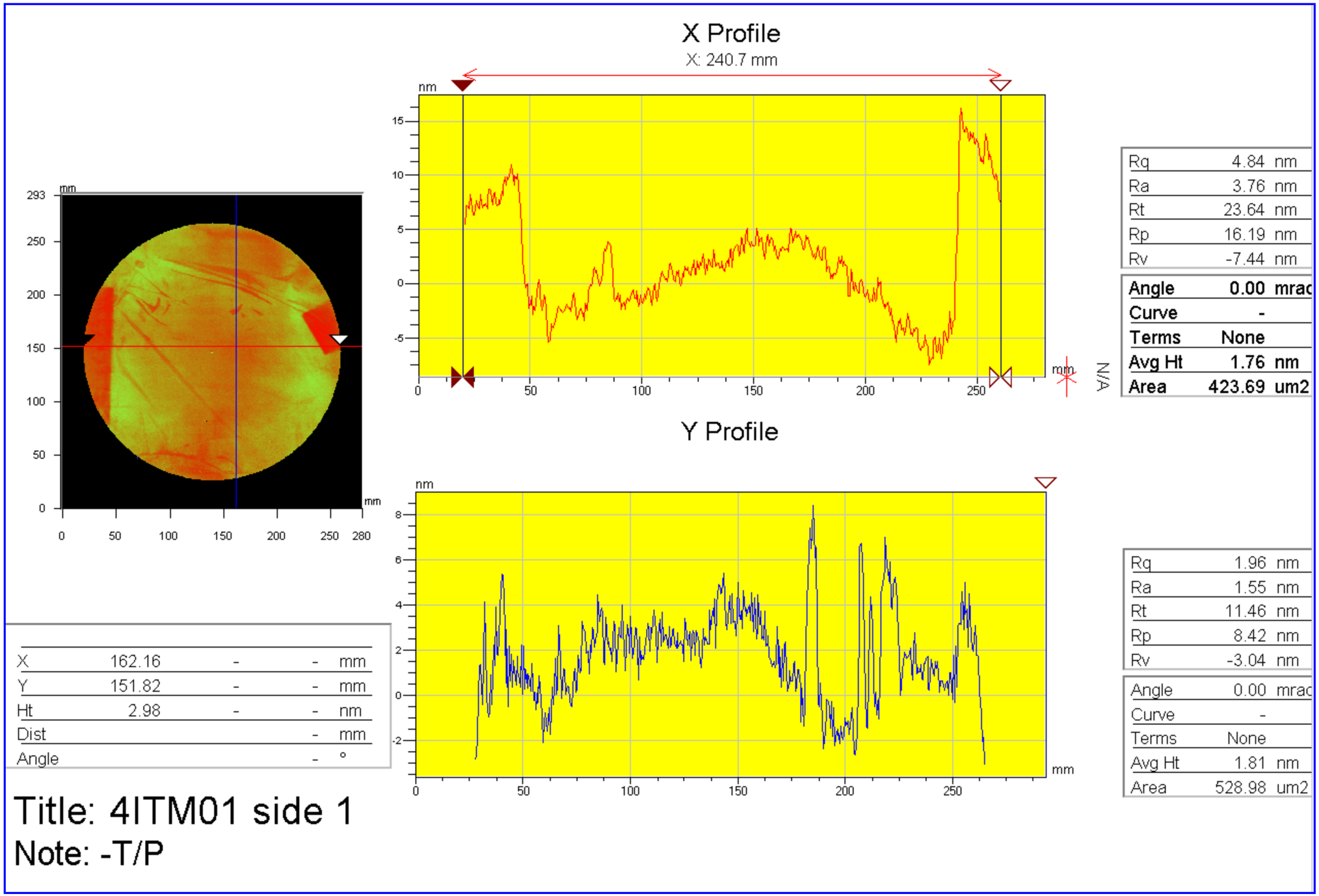
for a while. Our interest lies in how the surface has changed since the

piece left CSIRO lo, those many years ago! Specifically TOPO measurements at the locations that the phase maps show the streaks, and also where measured as a part of your initial certification.

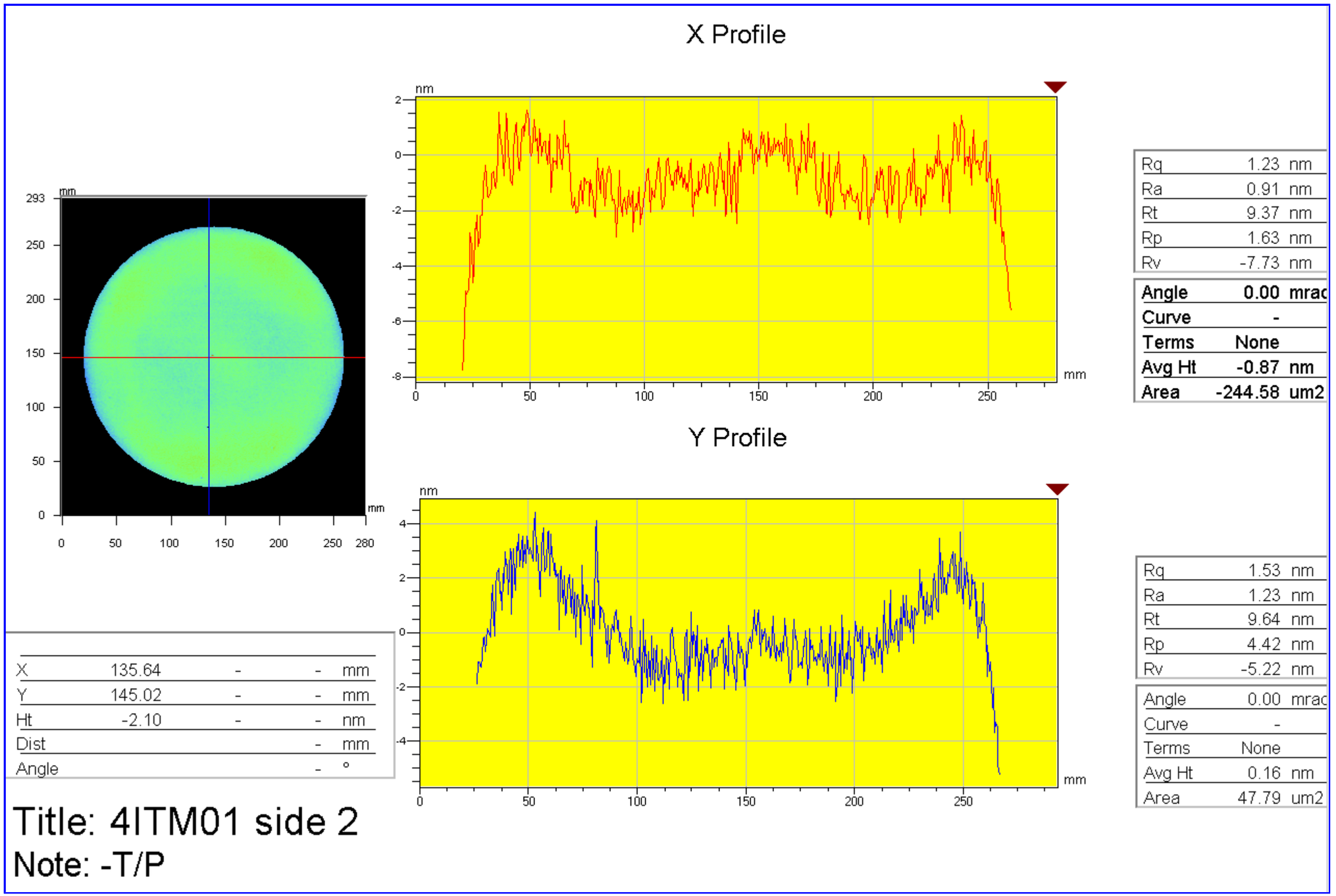
It was really great to see all of you, I'm so sorry I couldn't join you for lunch.
Cheers,
GariLynn

---------Included Message----------
>Date: Fri, 13 May 2005 17:12:57 +1000
>From: <Bob.Oreb@csiro.au>
>To: <Billingsley_G@ligo.caltech.edu>
>Cc: <ahelena@ligo.caltech.edu>, <Jeff.Seckold@csiro.au>
>Subject: RE: 4ITM01
>
>Dear Gari
>
>Firstly thank you and Helena very much for the wonderful reception you
>gave us during our recent visit to Caltech including the delicious lunch
>at the beautiful Athenaeum. I am always impressed with the beauty of the
>campus and Pasadena in general.
>We have received the 4ITM01 substrate and had a bit of an inspection of
>the two surfaces. I am told by Jeff that the surfaces are surprisingly
>dirty (possibly due to handling and exposure to unclean environment) and
>that doing TOPO measurements on the surfaces as is (without cleaning)
>will possibly be meaningless and a waste of time. I didn't want our guys
>to do any cleaning of the surfaces prior to obtaining your instructions.
>If you think that some useful data can be obtained before cleaning the
>surfaces we can do a set of TOPO measurements prior to any cleaning and
>if you like we can then clean the surfaces and remeasure. Please let me

>know how you want us to proceed.
>
>Regards
>
>Bob
>
>



4ITM01_side 1.gif



4ITM01_side 2.gif

X-IronPort-AV: i="3.93,130,1114956000";
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Date: Tue, 24 May 2005 18:22:23 +1000
X-MS-Has-Attach: yes
X-MS-TNEF-Correlator:
Thread-Topic: 4ITM01
Thread-Index: AcVb0S8MAwFJSjSiTpiL5gfxTVDvZgEaC63g
From: <Bob.Oreb@csiro.au>
To: <gari@ligo.caltech.edu>
X-OriginalArrivalTime: 24 May 2005 08:22:23.0594 (UTC) FILETIME=[B6302CA0:01C56039]
X-Spam-Score: undef - Domain Whitelisted (csiro.au:)
X-Scanned-By: CanIt (www . roaringpenguin . com) on 131.215.115.14

Gari

Please find attached the gif files for the TOPO measurements of Side 1
of 4ITM01 on 2.5X magnification. The X40 magnification data will follow
in a separate email.

Bob

-----Original Message-----
From: gari@ligo.caltech.edu [mailto:gari@ligo.caltech.edu]
Sent: Thursday, 19 May 2005 4:44 AM
To: Oreb, Bob (CIP, Lindfield)
Subject: RE: 4ITM01

Bob,
Yes, these are the same streaks that we have seen. Due to our limited
aperture though, we have not seen the linear (square) features at the
edges. I assume these are real and not any part of your measurement or
cleaning method.

The reason the TOPO measurements are important to us is that we want to
determine if it is this process that also causes the excess scatter we
see in the interferometers.
Currently we see about 60ppm per mirror of loss due to scatter. This is

far beyond what we would expect from microroughness and defects alone.
We have confirmed that the loss is high on our coated optics, even after

cleaning, so we don't think it is a contamination issue.

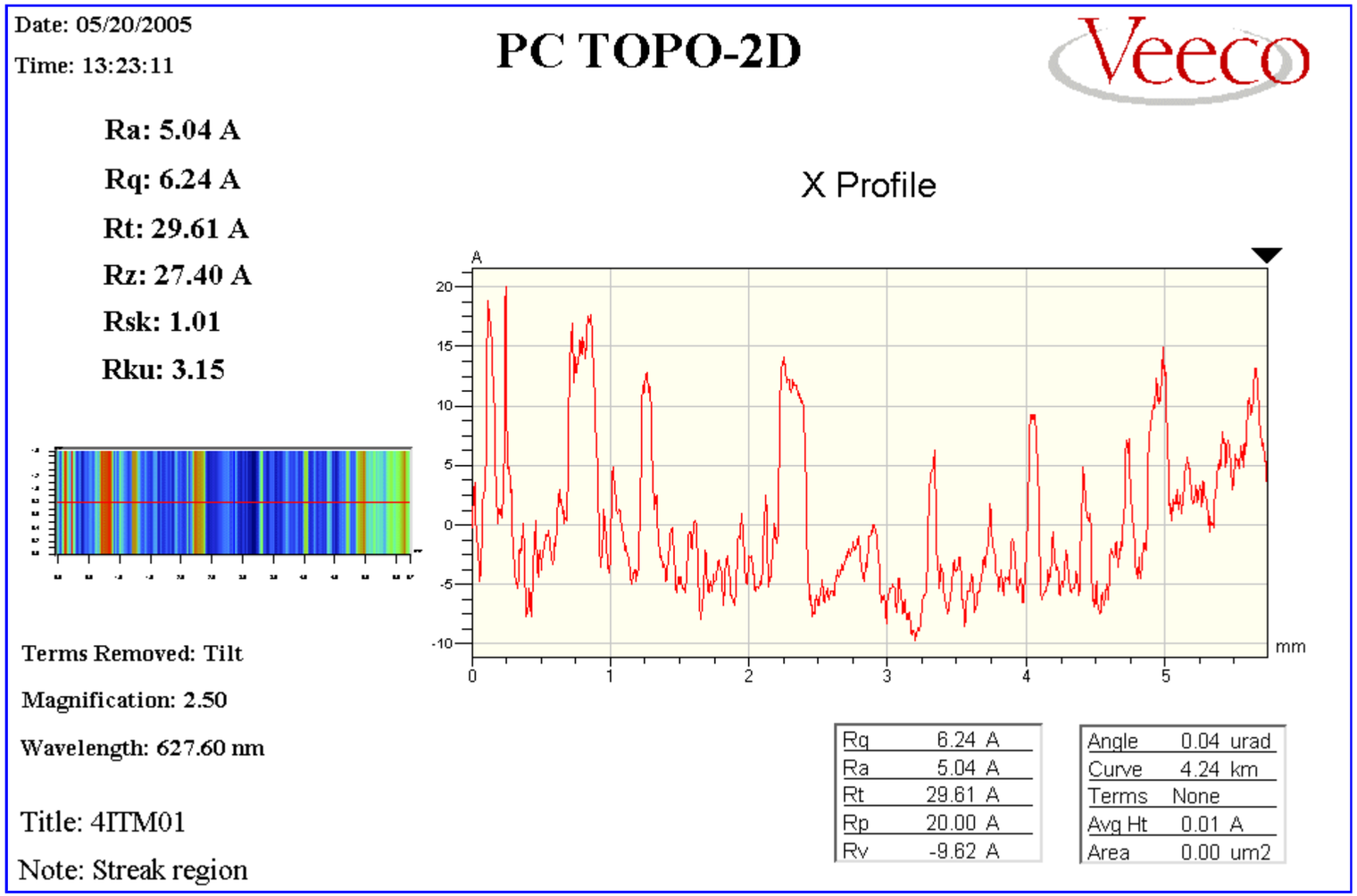
Our suspicion is that the liquinox cleaning (done before coating) not
only leaves these streaks, but may also spoil the microroughness.
So we do want to measure the part on the TOPO at the same locations that

were initially certified, so that we have a direct comparison of

microroughness.
We're also interested in the microroughness on a streaky (raised) area.

Perhaps the original surface roughness remains in these areas?

Cheers,
Gari



streak region.gif

Date: 05/20/2005

Time: 13:24:21

PC TOPO-2D

Veeco

Ra: 3.90 A

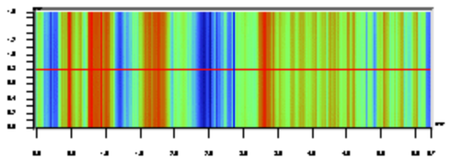
Rq: 4.94 A

Rt: 26.77 A

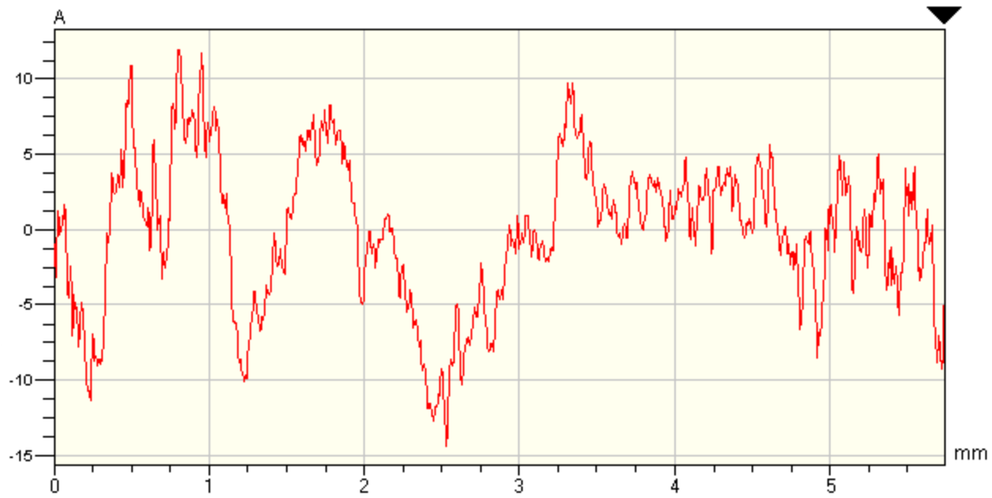
Rz: 24.27 A

Rsk: -0.30

Rku: 2.73



X Profile



Rq	4.94 A
Ra	3.90 A
Rt	26.24 A
Rp	11.93 A
Rv	-14.31 A

Angle	-0.02 urad
Curve	-
Terms	None
Avg Ht	-0.17 A
Area	-0.10 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: large zone near edge

large zone near edge.gif

Date: 05/20/2005

Time: 13:25:22

PC TOPO-2D

Veeco

Ra: 6.59 A

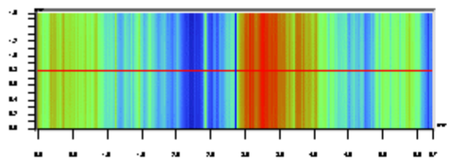
Rq: 8.02 A

Rt: 43.90 A

Rz: 37.10 A

Rsk: 0.25

Rku: 2.52



X Profile

Rq	8.02 A
Ra	6.59 A
Rt	43.28 A
Rp	22.42 A
Rv	-20.86 A

Angle	-0.50 urad
Curve	-451.93 km
Terms	None
Avg Ht	0.18 A
Area	0.10 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Large zone near edge

large zone near edge_2.gif

Mag: 2.5 X

Mode: PSI

Surface Data

Date: 05/20/2005

Time: 15:07:29

Surface Statistics:

Ra: 7.36 A

Rq: 9.96 A

Rz: 266.98 A

Rt: 1165.30 A

Rad Crv: 578.65 m

Set-up Parameters:

Size: 736 X 480

Sampling: 3.31 um

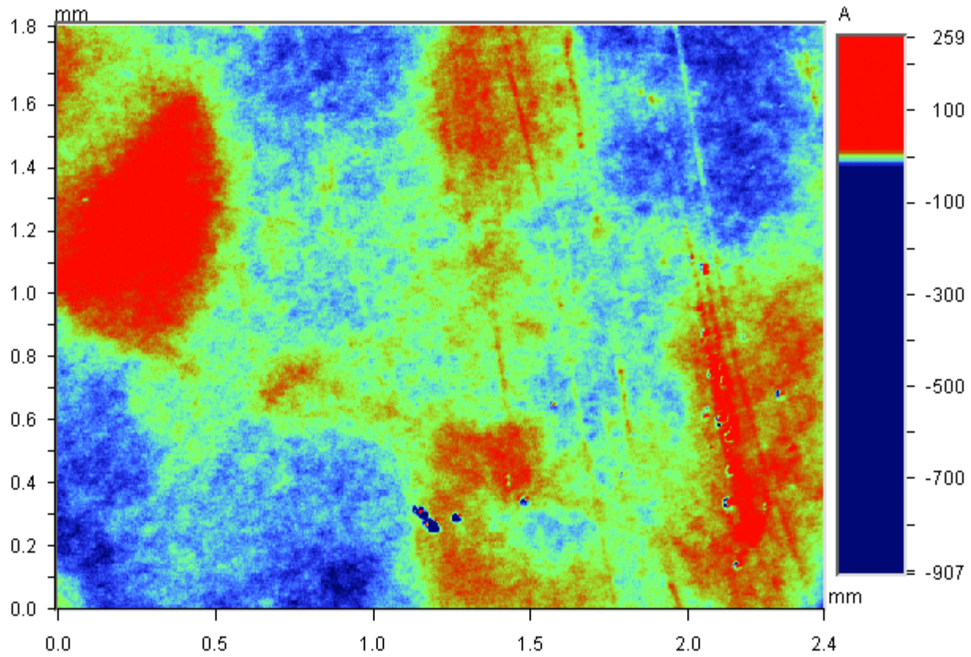
Processed Options:

Terms Removed:

Curvature & Tilt

Filtering:

None



Title: ITM04

Note: large raisesd area near edge

large zone near edge_3D.gif

Date: 05/20/2005

Time: 13:00:42

PC TOPO-2D

Veeco

Ra: 2.44 A

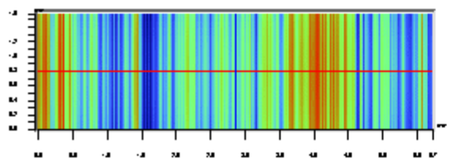
Rq: 3.02 A

Rt: 16.96 A

Rz: 15.07 A

Rsk: 0.19

Rku: 2.56



Terms Removed: Curvature & Tilt

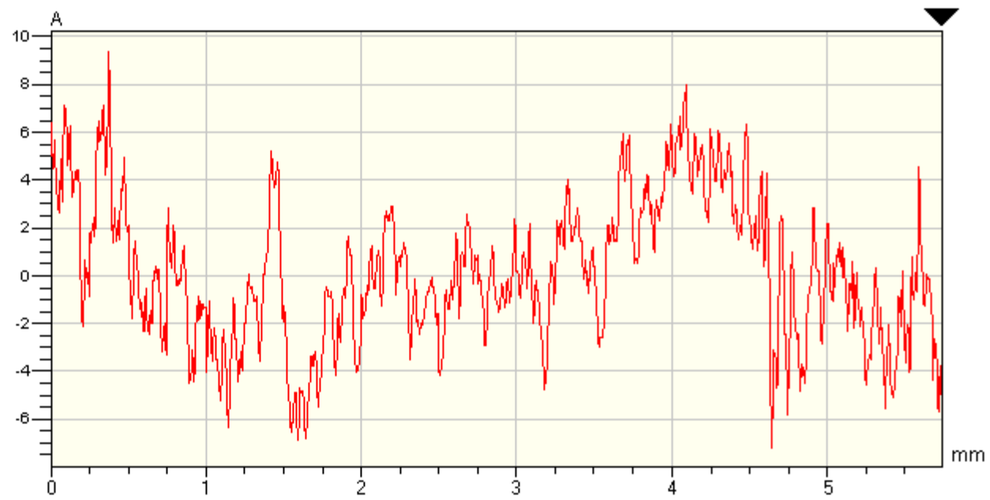
Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_A_1

X Profile



Rq	3.01 A
Ra	2.43 A
Rt	16.53 A
Rp	9.37 A
Rv	-7.16 A

Angle	-0.22 urad
Curve	-
Terms	None
Avg Ht	0.13 A
Area	0.08 um2

Position_A_1.gif

Date: 05/20/2005

Time: 13:01:44

PC TOPO-2D

Veeco

Ra: 2.73 A

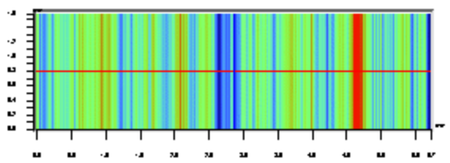
Rq: 3.61 A

Rt: 25.74 A

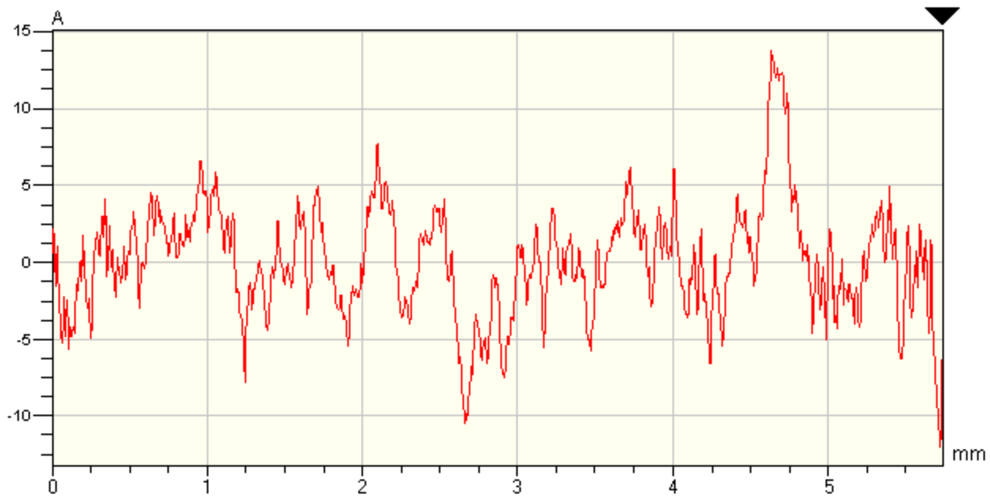
Rz: 22.28 A

Rsk: 0.32

Rku: 4.71



X Profile



Rq	3.61 A
Ra	2.73 A
Rt	25.66 A
Rp	13.72 A
Rv	-11.94 A

Angle	-0.05 urad
Curve	-
Terms	None
Avg Ht	0.01 A
Area	0.00 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_A_2

Position_A_2.gif

Date: 05/20/2005

Time: 13:03:01

PC TOPO-2D

Veeco

Ra: 1.61 A

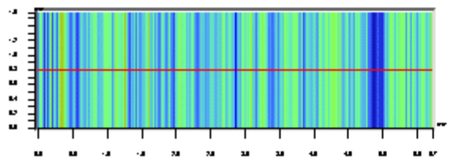
Rq: 2.11 A

Rt: 20.15 A

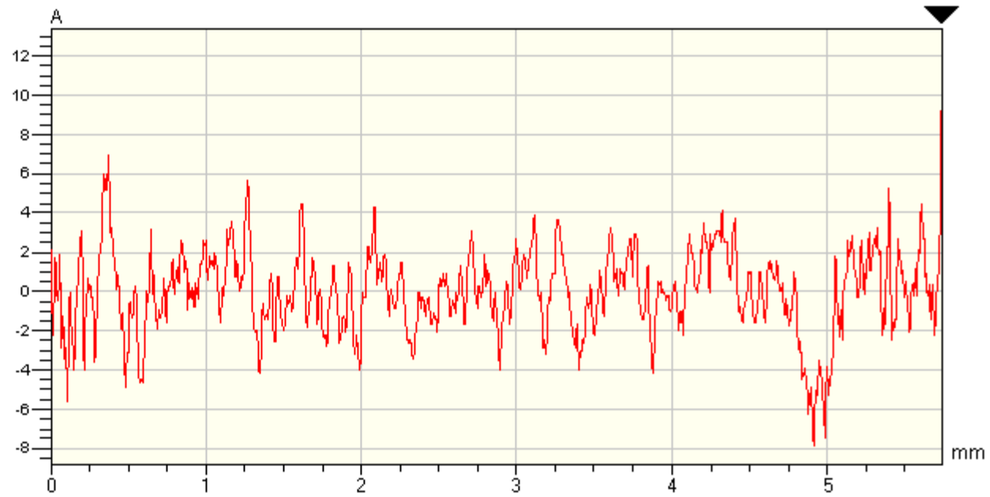
Rz: 15.02 A

Rsk: -0.08

Rku: 4.63



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_A_3

Rq	2.11 A
Ra	1.61 A
Rt	20.13 A
Rp	12.32 A
Rv	-7.80 A

Angle	0.18 urad
Curve	-
Terms	None
Avg Ht	-0.01 A
Area	-0.00 um2

Position_A_3.gif

Date: 05/20/2005

Time: 13:03:50

PC TOPO-2D

Veeco

Ra: 3.13 A

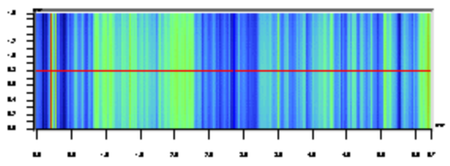
Rq: 3.96 A

Rt: 34.09 A

Rz: 24.38 A

Rsk: 0.32

Rku: 4.00



Terms Removed: Curvature & Tilt

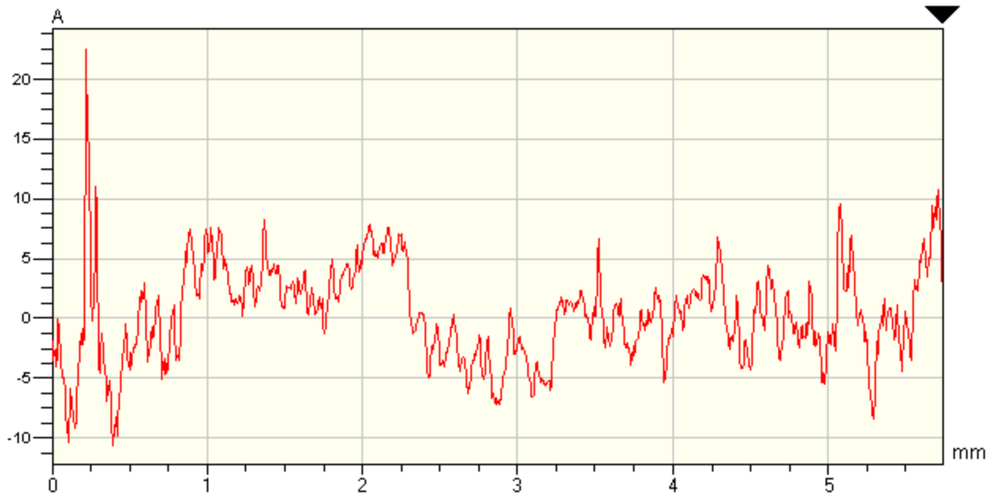
Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_B_1

X Profile



Rq	3.94 A
Ra	3.11 A
Rt	33.00 A
Rp	22.46 A
Rv	-10.54 A

Angle	0.03 urad
Curve	-
Terms	None
Avg Ht	0.33 A
Area	0.19 um2

Position_B_1.gif

Date: 05/20/2005

Time: 13:04:40

PC TOPO-2D

Veeco

Ra: 2.28 A

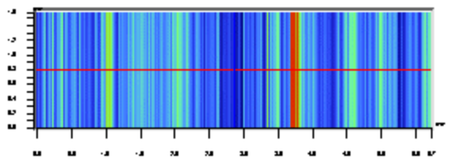
Rq: 3.21 A

Rt: 25.10 A

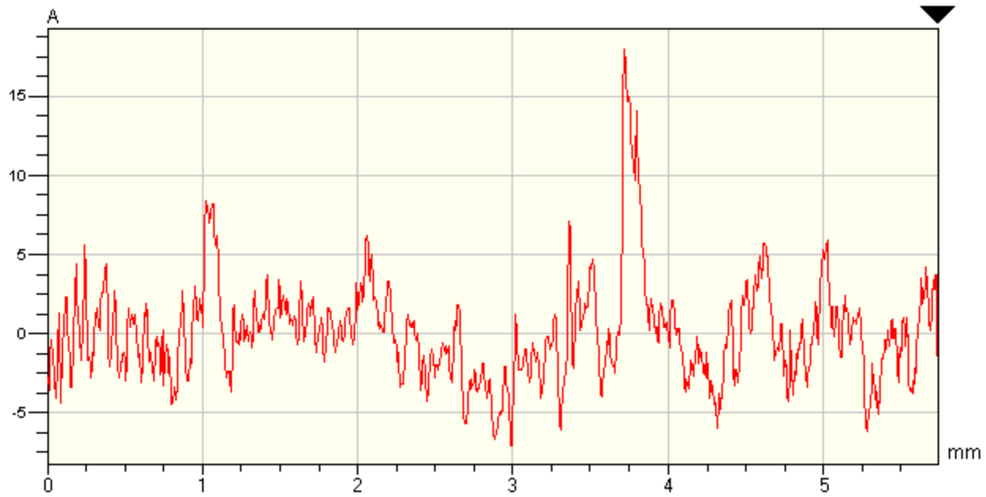
Rz: 21.49 A

Rsk: 1.54

Rku: 8.29



X Profile



Rq	3.21 A
Ra	2.28 A
Rt	24.95 A
Rp	17.95 A
Rv	-7.00 A

Angle	-0.02 urad
Curve	-
Terms	None
Avg Ht	0.05 A
Area	0.03 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_B_2

Position_B_2.gif

Date: 05/20/2005

Time: 13:05:33

PC TOPO-2D

Veeco

Ra: 3.61 A

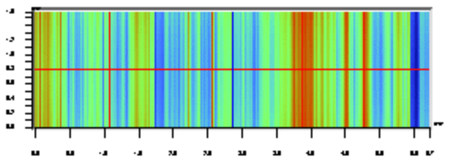
Rq: 4.51 A

Rt: 28.98 A

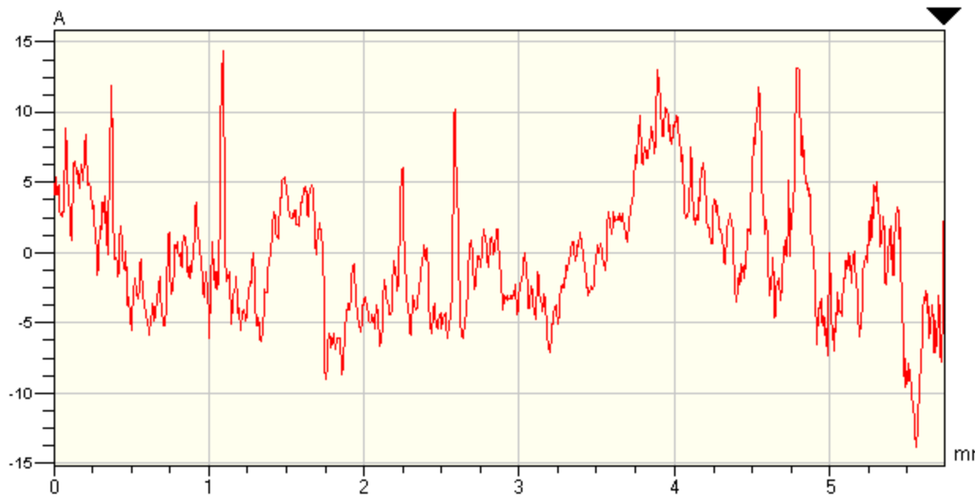
Rz: 24.41 A

Rsk: 0.46

Rku: 3.11



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	4.50 A
Ra	3.60 A
Rt	28.11 A
Rp	14.34 A
Rv	-13.77 A

Angle	0.06 urad
Curve	-597.40 km
Terms	None
Avg Ht	-0.28 A
Area	-0.16 um2

Title: 4ITM01

Note: Position_B_3

Position_B_3.gif

Date: 05/20/2005

Time: 13:06:24

PC TOPO-2D

Veeco

Ra: 3.12 A

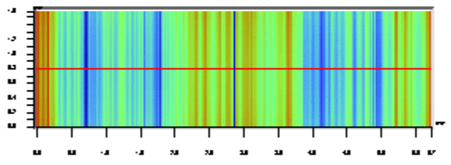
Rq: 3.85 A

Rt: 27.73 A

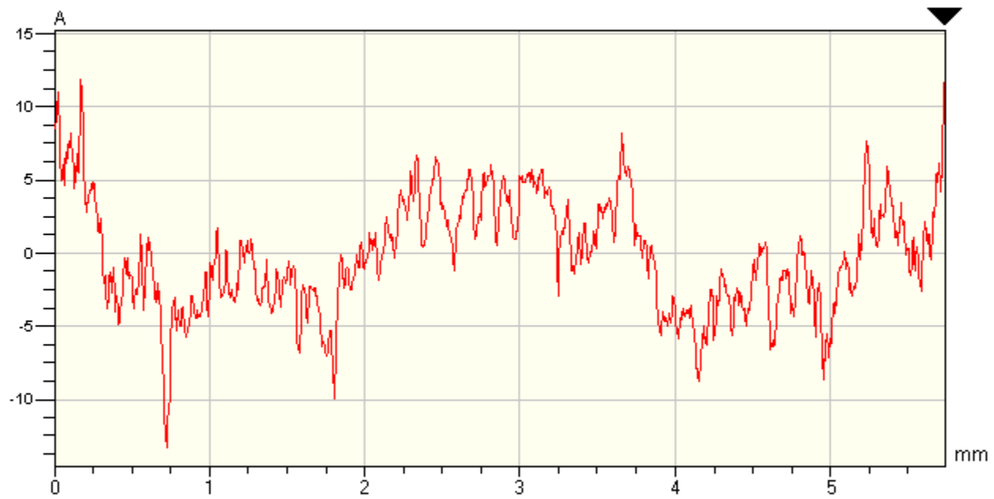
Rz: 22.44 A

Rsk: 0.12

Rku: 2.94



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	3.84 A
Ra	3.12 A
Rt	27.01 A
Rp	13.78 A
Rv	-13.23 A

Angle	0.09 urad
Curve	-
Terms	None
Avg Ht	-0.21 A
Area	-0.12 um2

Title: 4ITM01

Note: Position_C_1

Position_C_1.gif

Date: 05/20/2005

Time: 13:07:26

PC TOPO-2D

Veeco

Ra: 4.53 A

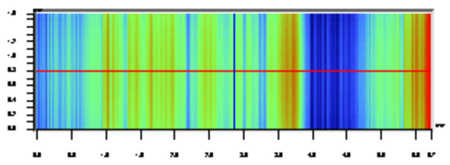
Rq: 5.78 A

Rt: 33.65 A

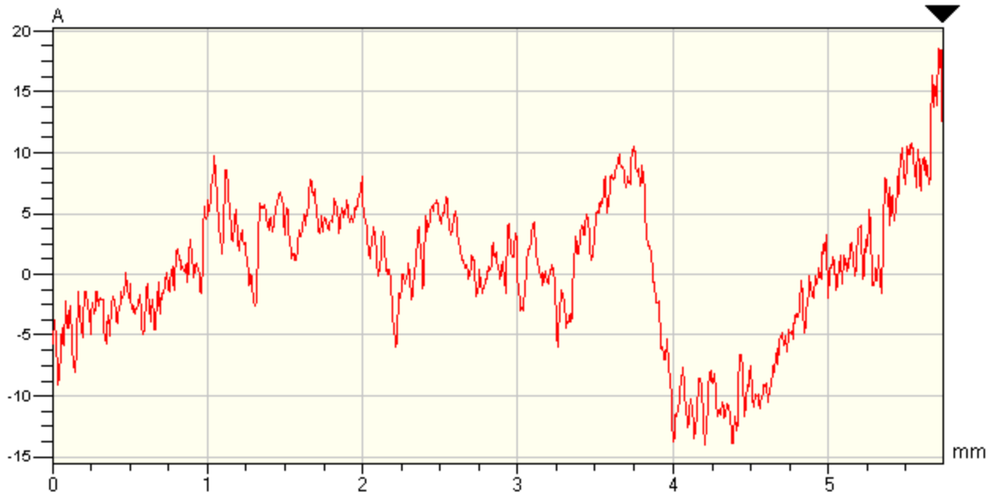
Rz: 28.98 A

Rsk: -0.23

Rku: 3.08



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	5.77 A
Ra	4.52 A
Rt	32.48 A
Rp	18.54 A
Rv	-13.93 A

Angle	0.23 urad
Curve	307.64 km
Terms	None
Avg Ht	0.37 A
Area	0.21 um2

Title: 4ITM01

Note: Position_C_2

Position_C_2.gif

Date: 05/20/2005

Time: 13:08:22

PC TOPO-2D

Veeco

Ra: 2.60 A

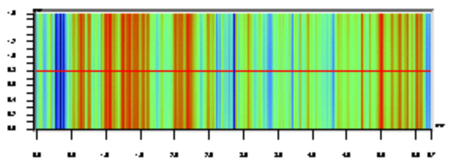
Rq: 3.27 A

Rt: 20.32 A

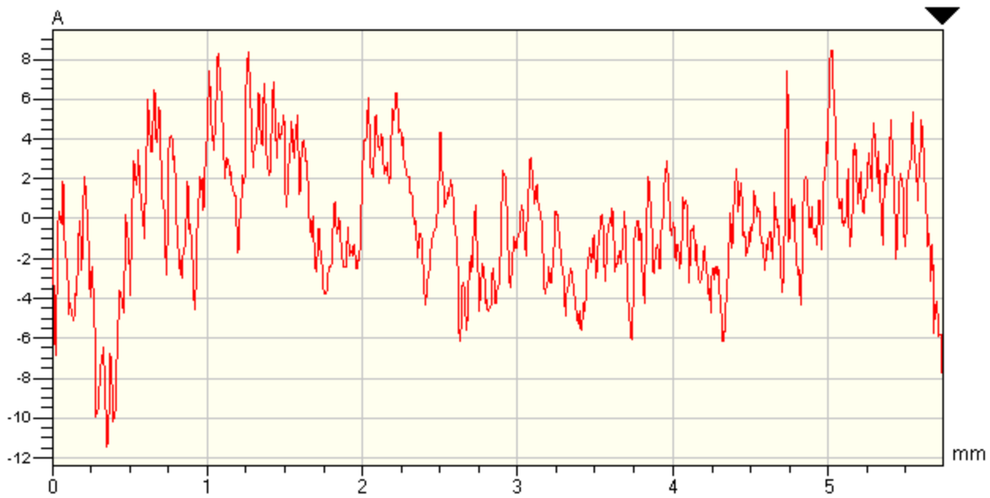
Rz: 18.70 A

Rsk: -0.10

Rku: 3.21



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	3.27 A
Ra	2.60 A
Rt	19.83 A
Rp	8.43 A
Rv	-11.39 A

Angle	-0.11 urad
Curve	-
Terms	None
Avg Ht	-0.15 A
Area	-0.09 um2

Title: 4ITM01

Note: Position_C_3

Position_C_3.gif

Date: 05/20/2005

Time: 13:09:01

PC TOPO-2D

Veeco

Ra: 1.88 A

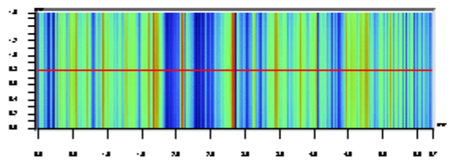
Rq: 2.40 A

Rt: 14.94 A

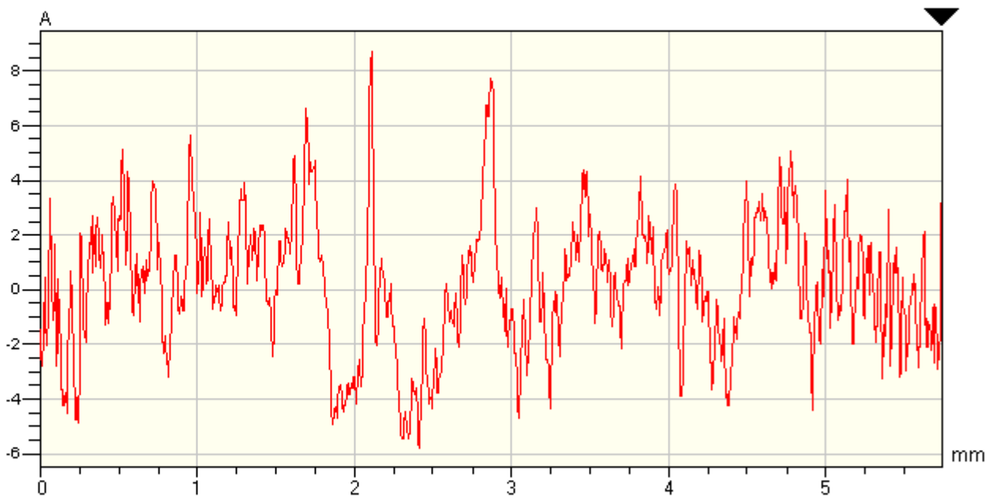
Rz: 13.18 A

Rsk: 0.13

Rku: 3.20



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_D_1

Rq	2.39 A
Ra	1.87 A
Rt	14.46 A
Rp	8.70 A
Rv	-5.76 A

Angle	0.14 urad
Curve	537.65 km
Terms	None
Avg Ht	0.15 A
Area	0.09 um2

Position_D_1.gif

Date: 05/20/2005

Time: 13:09:53

PC TOPO-2D

Veeco

Ra: 2.57 A

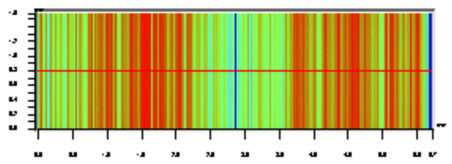
Rq: 3.22 A

Rt: 22.39 A

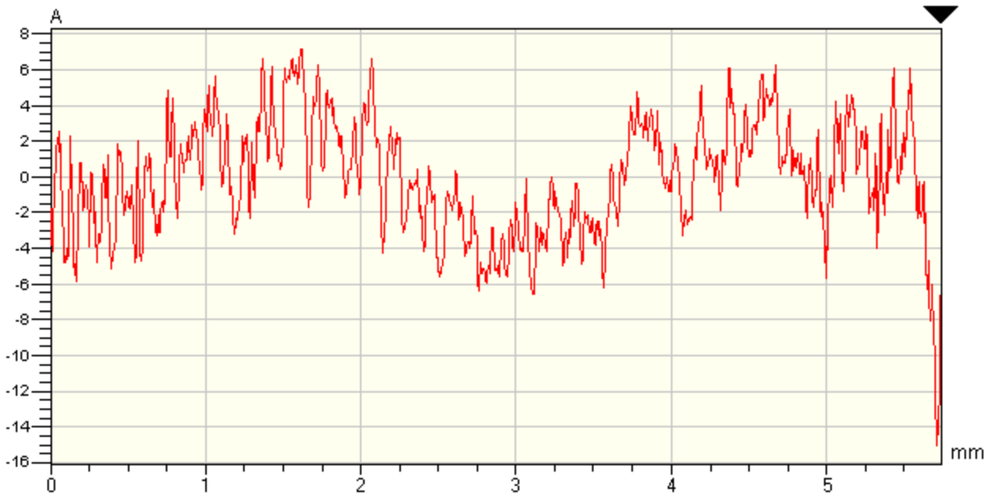
Rz: 16.37 A

Rsk: -0.45

Rku: 3.95



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_D_2

Rq	3.21 A
Ra	2.57 A
Rt	22.14 A
Rp	7.14 A
Rv	-14.99 A

Angle	-0.01 urad
Curve	-837.18 km
Terms	None
Avg Ht	-0.08 A
Area	-0.05 um2

Position_D_2.gif

Date: 05/20/2005

Time: 13:10:48

PC TOPO-2D

Veeco

Ra: 2.67 A

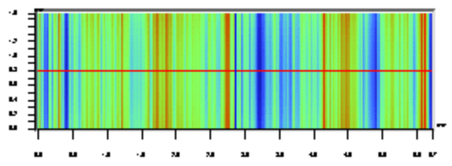
Rq: 3.42 A

Rt: 24.23 A

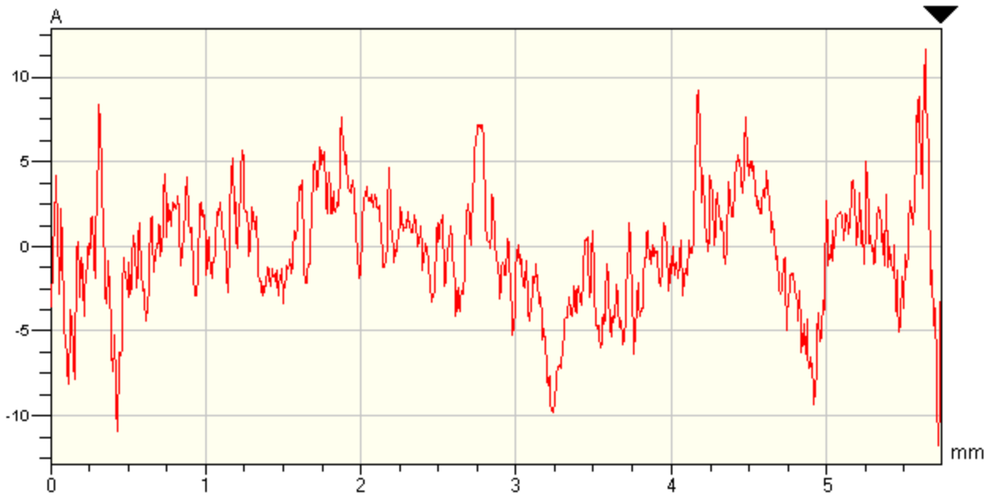
Rz: 20.63 A

Rsk: -0.13

Rku: 3.40



X Profile



Rq	3.41 A
Ra	2.67 A
Rt	23.31 A
Rp	11.62 A
Rv	-11.69 A

Angle	0.06 urad
Curve	-
Terms	None
Avg Ht	-0.28 A
Area	-0.16 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_D_3

Position_D_3.gif

Date: 05/20/2005

Time: 13:11:36

PC TOPO-2D

Veeco

Ra: 2.22 A

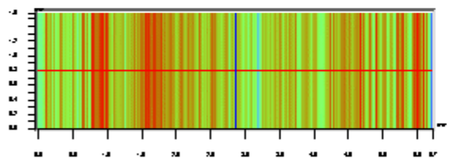
Rq: 2.98 A

Rt: 28.20 A

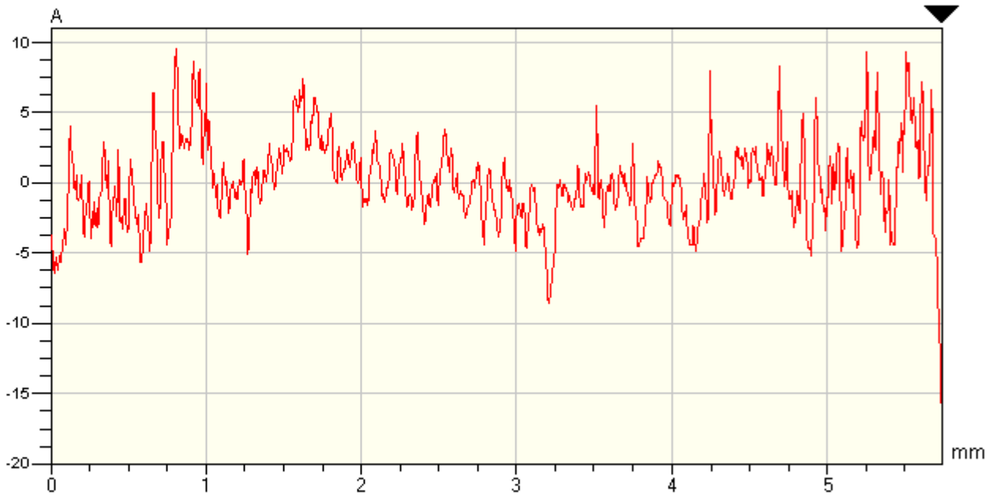
Rz: 19.98 A

Rsk: -0.13

Rku: 5.34



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_E_1

Rq	2.98 A
Ra	2.22 A
Rt	28.15 A
Rp	9.52 A
Rv	-18.63 A

Angle	-0.26 urad
Curve	-546.16 km
Terms	None
Avg Ht	0.01 A
Area	0.00 um2

Position_E_1.gif

Date: 05/20/2005

Time: 13:12:39

PC TOPO-2D

Veeco

Ra: 5.93 A

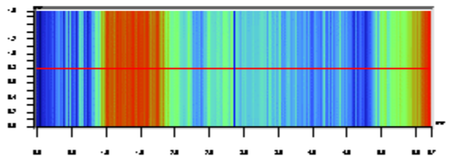
Rq: 7.35 A

Rt: 34.24 A

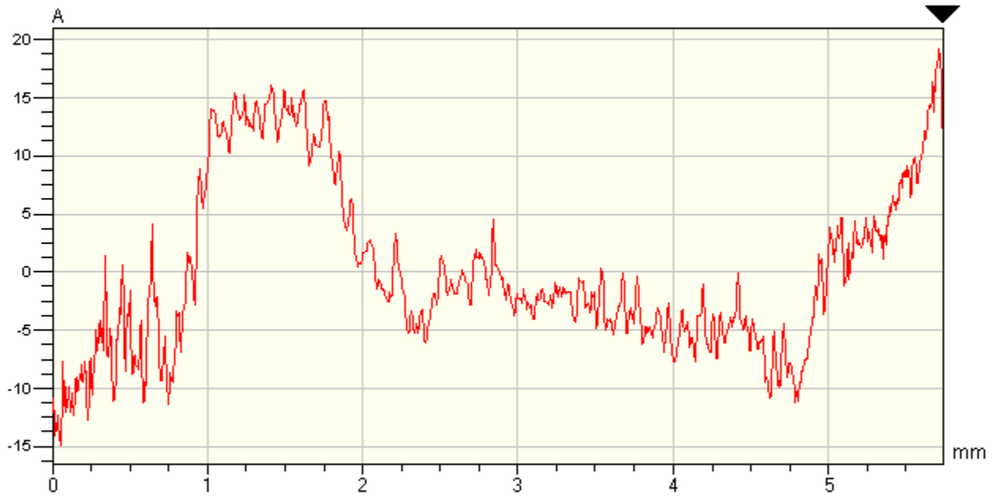
Rz: 30.82 A

Rsk: 0.67

Rku: 2.55



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_E_2

Rq	7.35 A
Ra	5.93 A
Rt	34.02 A
Rp	19.19 A
Rv	-14.83 A

Angle	0.35 urad
Curve	781.30 km
Terms	None
Avg Ht	0.08 A
Area	0.04 um2

Position_E_2.gif

Date: 05/20/2005

Time: 13:13:33

PC TOPO-2D

Veeco

Ra: 3.06 A

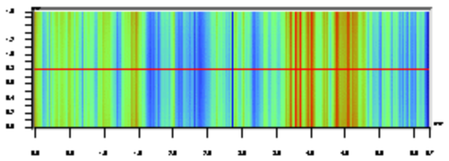
Rq: 3.82 A

Rt: 25.87 A

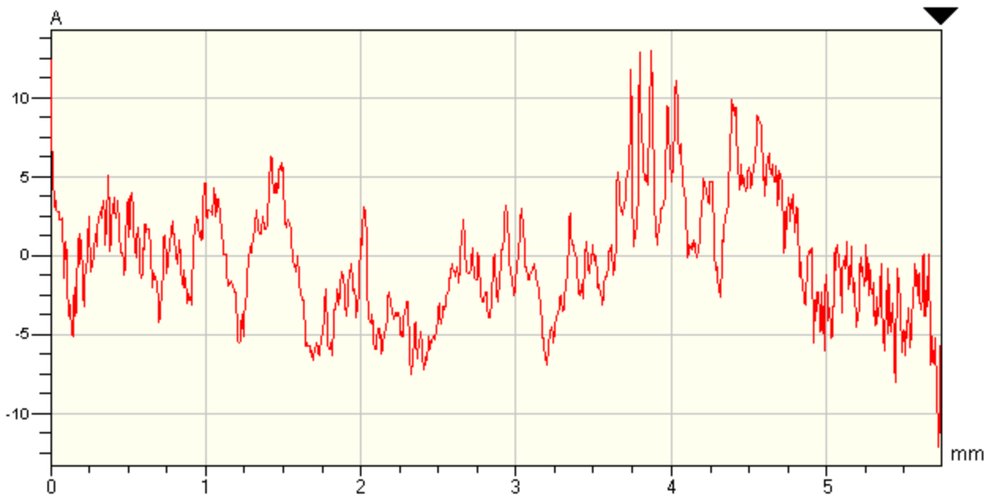
Rz: 21.84 A

Rsk: 0.41

Rku: 3.15



X Profile



Rq	3.81 A
Ra	3.05 A
Rt	25.03 A
Rp	12.96 A
Rv	-12.07 A

Angle	-0.23 urad
Curve	-372.56 km
Terms	None
Avg Ht	-0.27 A
Area	-0.15 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_E_3

Position_E_3.gif

Date: 05/20/2005

Time: 13:14:14

PC TOPO-2D

Veeco

Ra: 3.38 A

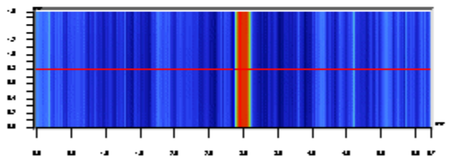
Rq: 6.22 A

Rt: 43.90 A

Rz: 38.99 A

Rsk: 3.66

Rku: 18.42



X Profile

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	6.22 A
Ra	3.38 A
Rt	43.44 A
Rp	35.92 A
Rv	-7.52 A

Angle	0.02 urad
Curve	-740.54 km
Terms	None
Avg Ht	-0.15 A
Area	-0.09 um2

Title: 4ITM01

Note: Position_F_1

Position_F_1.gif

Date: 05/20/2005

Time: 13:15:42

PC TOPO-2D

Veeco

Ra: 2.70 A

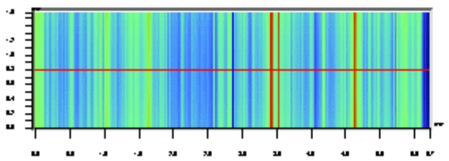
Rq: 3.96 A

Rt: 39.31 A

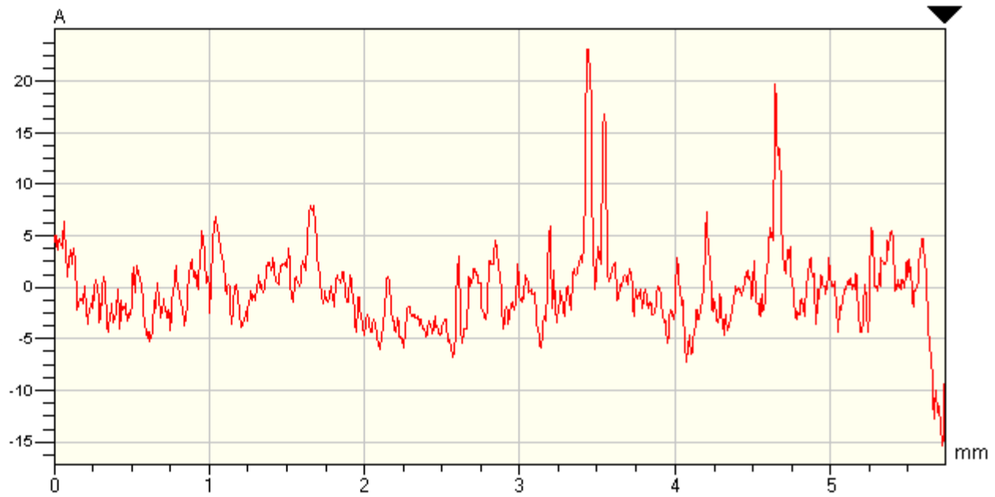
Rz: 30.49 A

Rsk: 1.41

Rku: 10.74



X Profile



Rq	3.95 A
Ra	2.68 A
Rt	38.29 A
Rp	23.04 A
Rv	-15.25 A

Angle	-0.20 urad
Curve	-443.13 km
Terms	None
Avg Ht	-0.33 A
Area	-0.19 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_F_2

Position_F_2.gif

Date: 05/20/2005

Time: 13:16:30

PC TOPO-2D

Veeco

Ra: 8.74 A

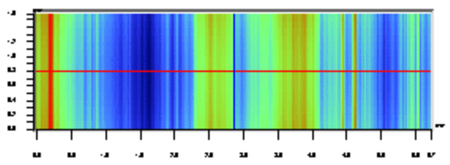
Rq: 10.62 A

Rt: 60.80 A

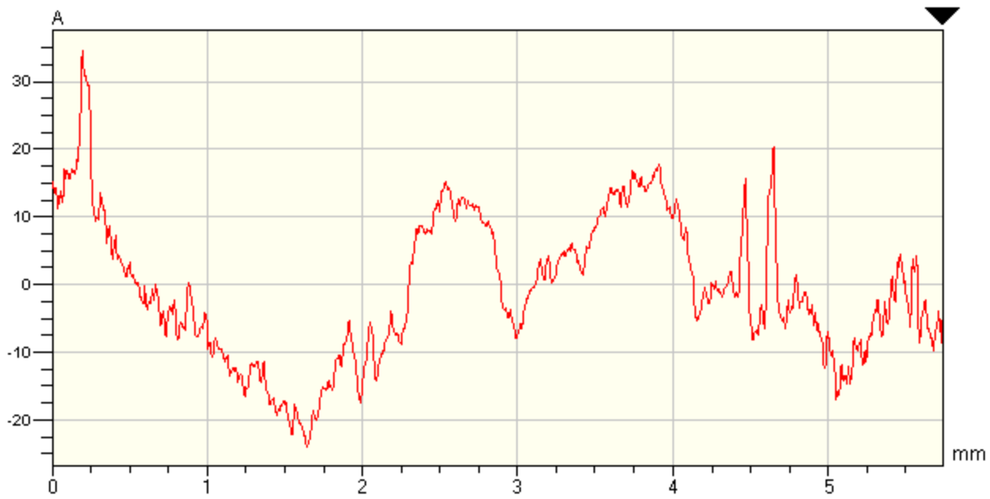
Rz: 49.89 A

Rsk: 0.25

Rku: 2.64



X Profile



Rq	10.59 A
Ra	8.72 A
Rt	58.40 A
Rp	34.53 A
Rv	-23.87 A

Angle	-0.43 urad
Curve	-153.51 km
Terms	None
Avg Ht	-0.76 A
Area	-0.44 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_F_3

Position_F_3.gif

Date: 05/20/2005

Time: 13:17:16

PC TOPO-2D

Veeco

Ra: 4.50 A

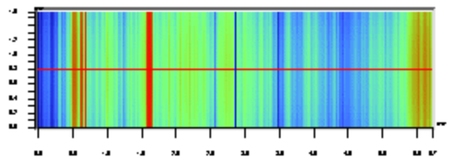
Rq: 6.27 A

Rt: 44.45 A

Rz: 39.32 A

Rsk: 0.79

Rku: 5.11



X Profile

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_G_1

Rq	6.25 A
Ra	4.48 A
Rt	42.75 A
Rp	24.92 A
Rv	-17.82 A

Angle	0.42 urad
Curve	180.74 km
Terms	None
Avg Ht	0.56 A
Area	0.32 um2

Position_G_1.gif

Date: 05/20/2005

Time: 13:18:21

PC TOPO-2D

Veeco

Ra: 3.12 A

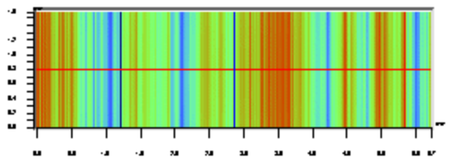
Rq: 3.78 A

Rt: 26.02 A

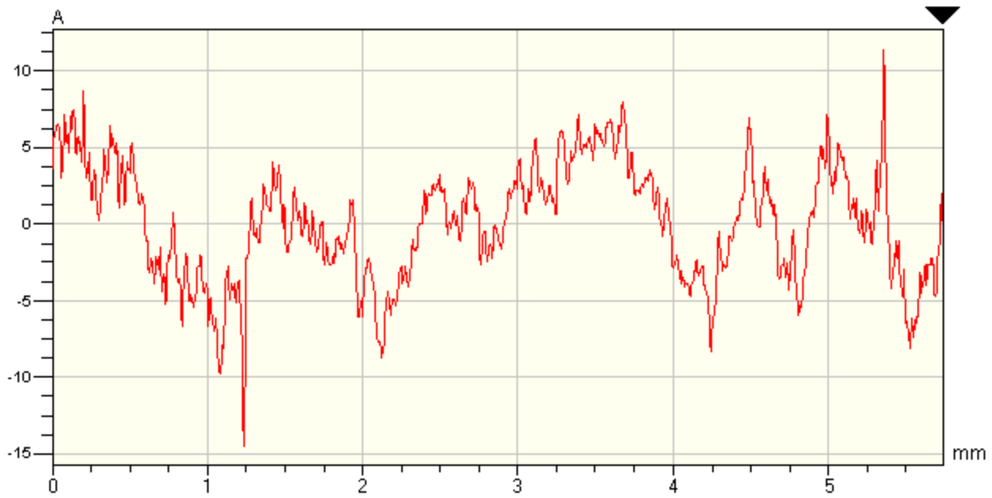
Rz: 19.89 A

Rsk: -0.18

Rku: 2.68



X Profile



Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Rq	3.78 A
Ra	3.12 A
Rt	25.80 A
Rp	11.37 A
Rv	-14.44 A

Angle	-0.07 urad
Curve	-
Terms	None
Avg Ht	0.06 A
Area	0.03 um2

Title: 4ITM01

Note: Position_G_2

Position_G_2.gif

Date: 05/20/2005

Time: 13:19:03

PC TOPO-2D

Veeco

Ra: 3.09 A

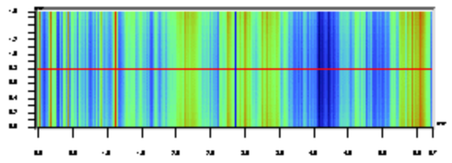
Rq: 3.81 A

Rt: 26.25 A

Rz: 21.07 A

Rsk: 0.09

Rku: 2.91



X Profile

Rq	3.79 A
Ra	3.07 A
Rt	24.92 A
Rp	14.14 A
Rv	-10.77 A

Angle	-0.09 urad
Curve	-174.16 km
Terms	None
Avg Ht	-0.43 A
Area	-0.25 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_G_3

Position_G_3.gif

Date: 05/20/2005

Time: 13:19:54

PC TOPO-2D

Veeco

Ra: 3.60 A

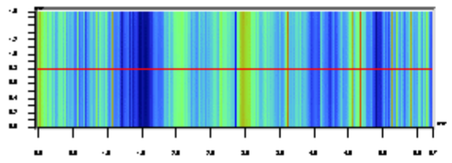
Rq: 4.83 A

Rt: 36.52 A

Rz: 29.40 A

Rsk: 0.22

Rku: 4.20



X Profile

Rq	4.83 A
Ra	3.60 A
Rt	36.07 A
Rp	23.37 A
Rv	-12.70 A

Angle	-0.32 urad
Curve	-330.26 km
Terms	None
Avg Ht	-0.16 A
Area	-0.09 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_H_1

Position_H_1.gif

Date: 05/20/2005

Time: 13:20:45

PC TOPO-2D

Veeco

Ra: 3.20 A

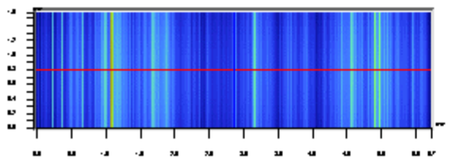
Rq: 4.56 A

Rt: 52.03 A

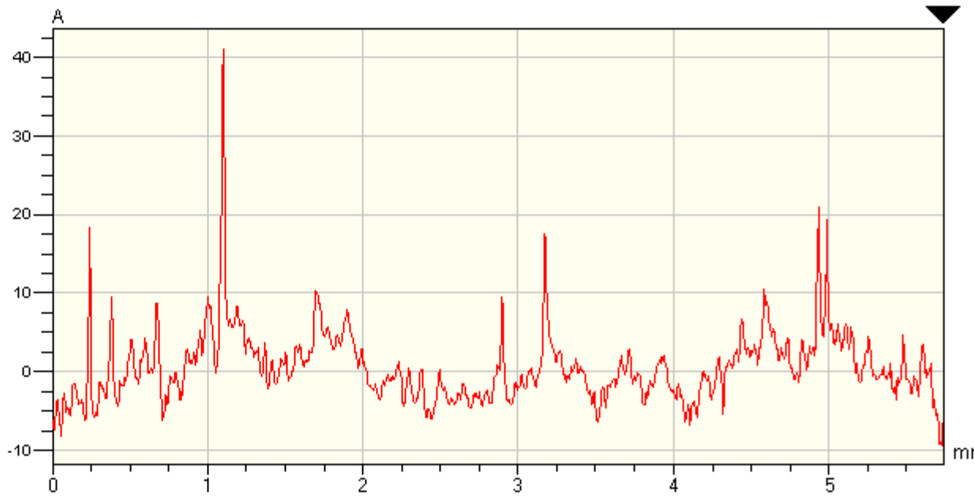
Rz: 34.90 A

Rsk: 2.36

Rku: 16.98



X Profile



Rq	4.53 A
Ra	3.18 A
Rt	50.30 A
Rp	41.01 A
Rv	-9.28 A

Angle	0.04 urad
Curve	243.64 km
Terms	None
Avg Ht	0.55 A
Area	0.31 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_H_2

Position_H_2.gif

Date: 05/20/2005

Time: 13:21:37

PC TOPO-2D

Veeco

Ra: 4.62 A

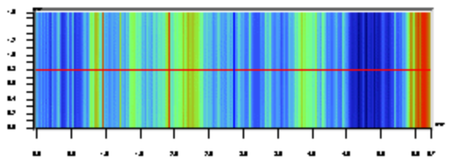
Rq: 6.08 A

Rt: 35.69 A

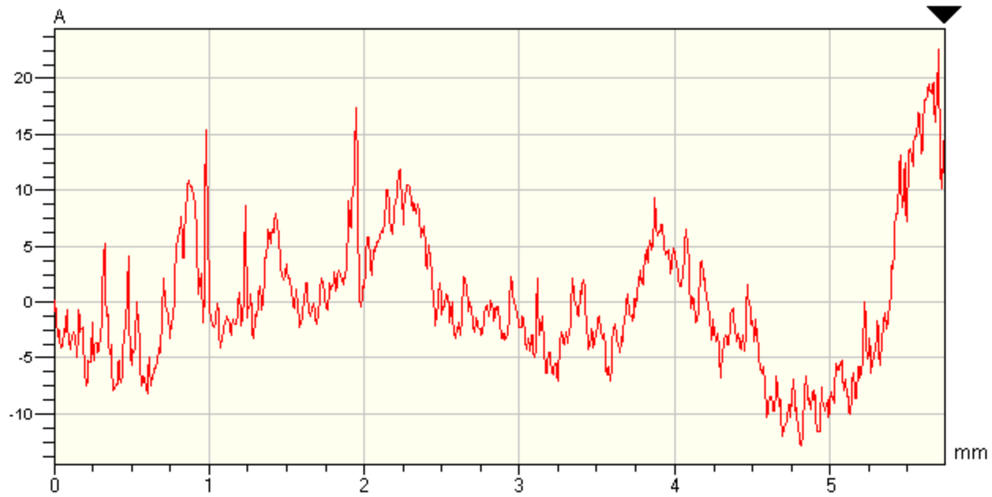
Rz: 31.62 A

Rsk: 0.81

Rku: 3.82



X Profile



Rq	6.08 A
Ra	4.62 A
Rt	35.35 A
Rp	22.60 A
Rv	-12.75 A

Angle	0.32 urad
Curve	844.94 km
Terms	None
Avg Ht	-0.10 A
Area	-0.06 um2

Terms Removed: Curvature & Tilt

Magnification: 2.50

Wavelength: 627.60 nm

Title: 4ITM01

Note: Position_H_3

Position_H_3.gif

X-IronPort-AV: i="3.93,130,1114956000";
  d="gif'147?scan'147,208,147"; a="38915558:sNHT510879762"
Subject: RE: 4ITM01
Date: Tue, 24 May 2005 18:24:20 +1000
X-MS-Has-Attach: yes
X-MS-TNEF-Correlator:
Thread-Topic: 4ITM01
Thread-Index: AcVb0S8MAwFJSjSiTpiL5gfxTVDvZgEaKCEw
From: <Bob.Oreb@csiro.au>
To: <gari@ligo.caltech.edu>
X-OriginalArrivalTime: 24 May 2005 08:24:20.0717 (UTC) FILETIME=[FBFFB9D0:01C56039]
X-Spam-Score: undef - Domain Whitelisted (csiro.au:)
X-Scanned-By: CanIt (www . roaringpenguin . com) on 131.215.115.14

Gari

Please find attached the gif files for the TOPO measurements of Side 1
of 4ITM01 on 40X magnification.

Bob

-----Original Message-----
From: gari@ligo.caltech.edu [mailto:gari@ligo.caltech.edu]
Sent: Thursday, 19 May 2005 4:44 AM
To: Oreb, Bob (CIP, Lindfield)
Subject: RE: 4ITM01

Bob,
Yes, these are the same streaks that we have seen. Due to our limited
aperture though, we have not seen the linear (square) features at the
edges. I assume these are real and not any part of your measurement or
cleaning method.

The reason the TOPO measurements are important to us is that we want to
determine if it is this process that also causes the excess scatter we
see in the interferometers.
Currently we see about 60ppm per mirror of loss due to scatter. This is

far beyond what we would expect from microroughness and defects alone.
We have confirmed that the loss is high on our coated optics, even after

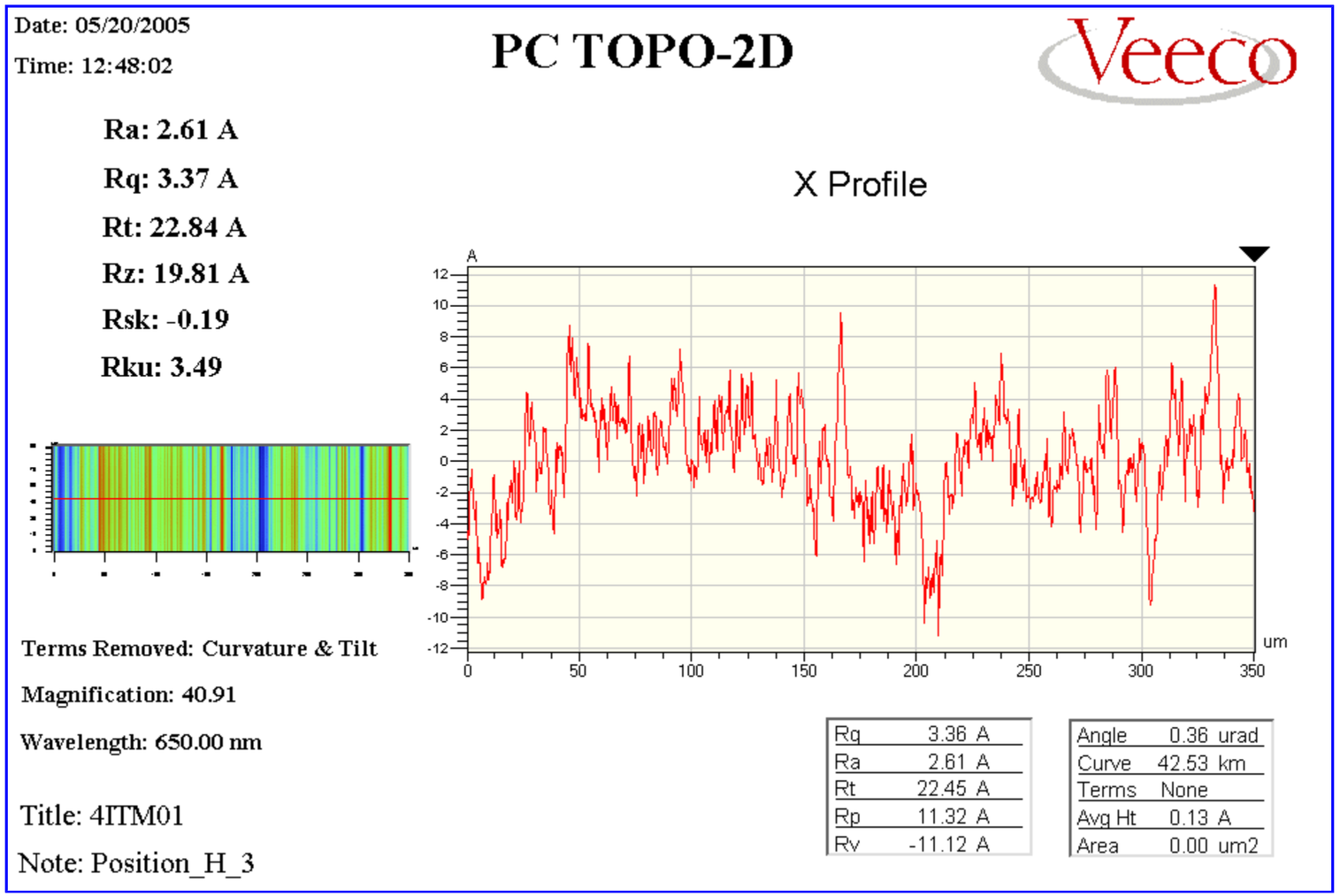
cleaning, so we don't think it is a contamination issue.

Our suspicion is that the liquinox cleaning (done before coating) not
only leaves these streaks, but may also spoil the microroughness.
So we do want to measure the part on the TOPO at the same locations that

were initially certified, so that we have a direct comparison of
microroughness.
We're also interested in the microroughness on a streaky (raised) area.

Perhaps the original surface roughness remains in these areas?

Cheers,
Gari



position_H_31.gif

Date: 05/20/2005

Time: 11:10:43

PC TOPO-2D

Veeco

Ra: 3.10 A

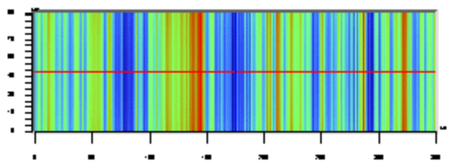
Rq: 3.78 A

Rt: 21.88 A

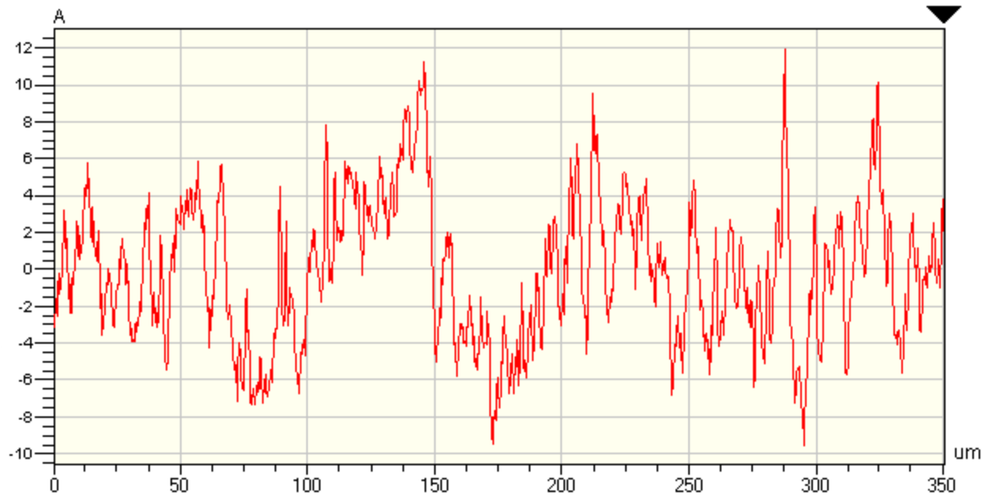
Rz: 19.72 A

Rsk: 0.25

Rku: 2.70



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Rq	3.78 A
Ra	3.10 A
Rt	21.38 A
Rp	11.90 A
Rv	-9.48 A

Angle	1.12 urad
Curve	-102.56 km
Terms	None
Avg Ht	-0.15 A
Area	-0.01 um2

Title: 4ITM01

Note: position A_1

position_A_11.gif

Date: 05/20/2005

Time: 11:25:24

PC TOPO-2D

Veeco

Ra: 2.68 A

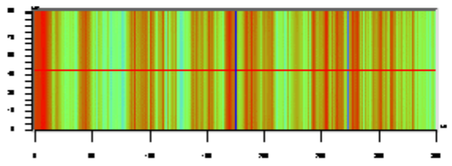
Rq: 3.34 A

Rt: 29.22 A

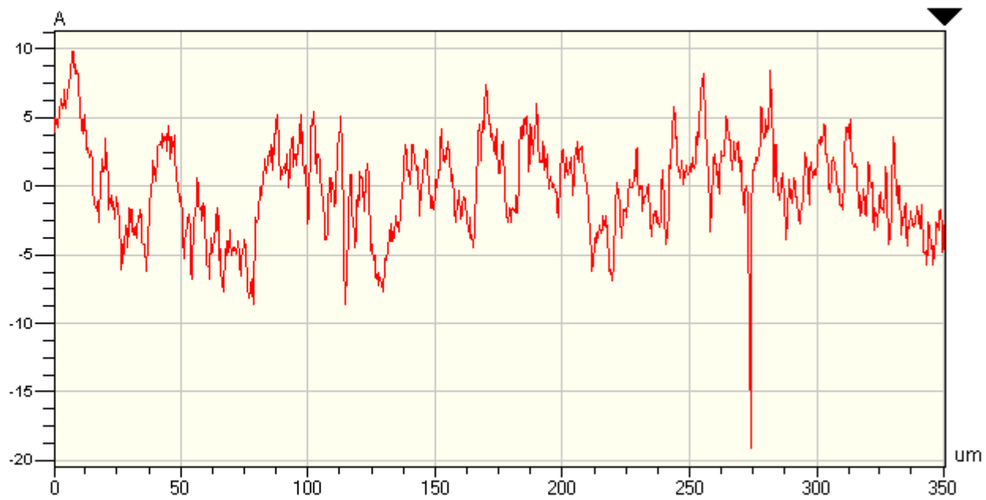
Rz: 20.48 A

Rsk: -0.19

Rku: 3.76



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_A_2

Rq	3.34 A
Ra	2.68 A
Rt	28.84 A
Rp	9.81 A
Rv	-19.03 A

Angle	-1.90 urad
Curve	-4.03 km
Terms	None
Avg Ht	-0.13 A
Area	-0.00 um2

position_A_21.gif

Date: 05/20/2005

Time: 11:26:30

PC TOPO-2D

Veeco

Ra: 2.77 A

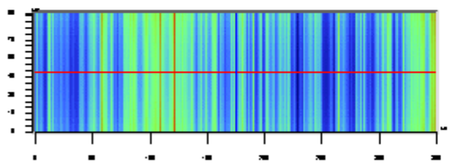
Rq: 3.49 A

Rt: 29.41 A

Rz: 21.49 A

Rsk: 0.33

Rku: 3.73



X Profile

Rq	3.46 A
Ra	2.74 A
Rt	27.92 A
Rp	17.95 A
Rv	-9.98 A

Angle	2.56 urad
Curve	-5.01 km
Terms	None
Avg Ht	-0.44 A
Area	-0.02 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_A_3

position_A_31.gif

Date: 05/20/2005

Time: 11:27:41

PC TOPO-2D

Veeco

Ra: 5.17 A

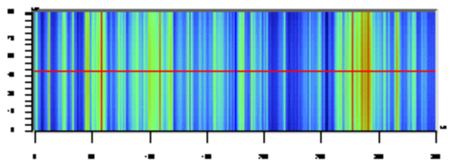
Rq: 6.59 A

Rt: 44.03 A

Rz: 37.41 A

Rsk: 0.86

Rku: 3.89



X Profile

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_B_1

Rq	6.57 A
Ra	5.15 A
Rt	42.13 A
Rp	28.75 A
Rv	-13.38 A

Angle	-1.31 urad
Curve	1.71 km
Terms	None
Avg Ht	0.59 A
Area	0.02 um2

position_B_11.gif

Date: 05/20/2005

Time: 11:28:36

PC TOPO-2D

Veeco

Ra: 4.62 A

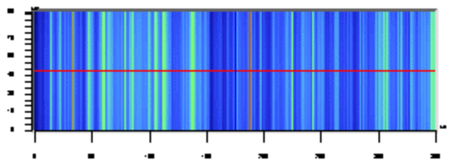
Rq: 6.41 A

Rt: 66.71 A

Rz: 46.66 A

Rsk: 1.57

Rku: 9.36



X Profile

Rq	6.41 A
Ra	4.61 A
Rt	65.68 A
Rp	49.39 A
Rv	-16.29 A

Angle	10.32 urad
Curve	0.66 km
Terms	None
Avg Ht	0.32 A
Area	0.01 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_B_2

position_B_21.gif

Date: 05/20/2005

Time: 11:29:28

PC TOPO-2D

Veeco

Ra: 4.04 A

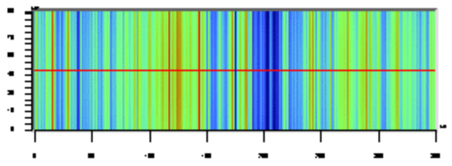
Rq: 5.14 A

Rt: 36.21 A

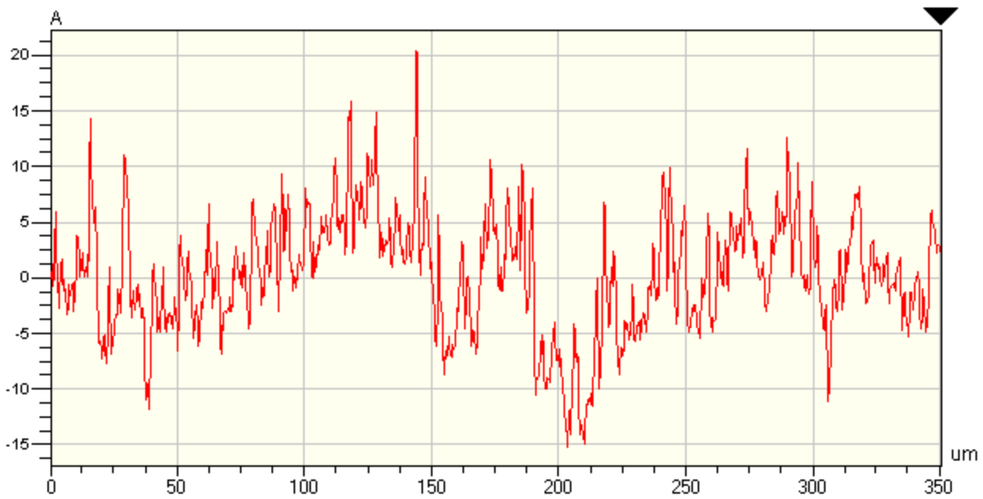
Rz: 30.63 A

Rsk: -0.04

Rku: 3.44



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_B_3

Rq	5.14 A
Ra	4.03 A
Rt	35.49 A
Rp	20.37 A
Rv	-15.11 A

Angle	0.62 urad
Curve	1.41 km
Terms	None
Avg Ht	0.23 A
Area	0.01 um2

position_B_31.gif

Date: 05/20/2005

Time: 11:30:23

PC TOPO-2D

Veeco

Ra: 2.79 A

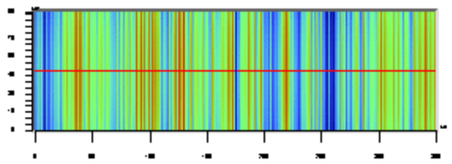
Rq: 3.45 A

Rt: 21.49 A

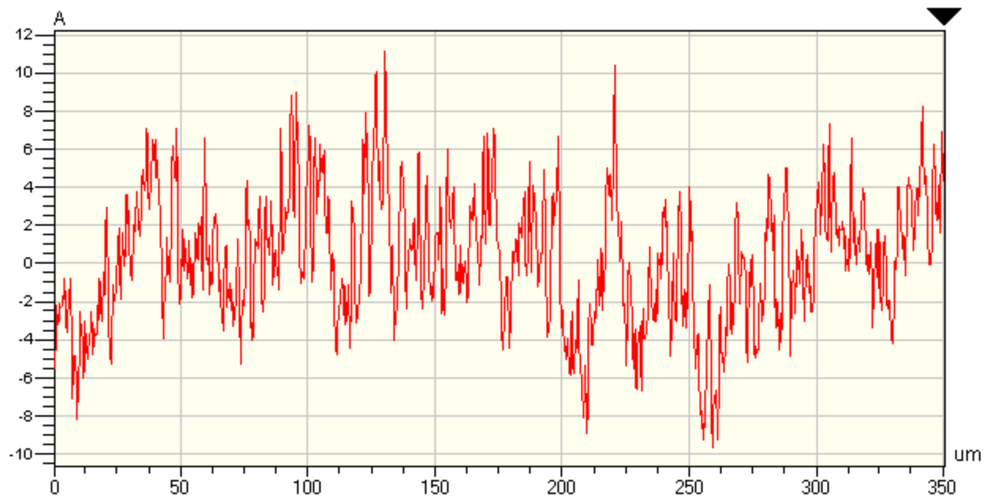
Rz: 19.92 A

Rsk: 0.01

Rku: 2.83



X Profile



Rq	3.44	A
Ra	2.79	A
Rt	20.73	A
Rp	11.13	A
Rv	-9.61	A

Angle	2.51	urad
Curve	1.73	km
Terms	None	
Avg Ht	0.22	A
Area	0.01	um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_C_1

position_C_11.gif

Date: 05/20/2005

Time: 11:31:22

PC TOPO-2D

Veeco

Ra: 3.15 A

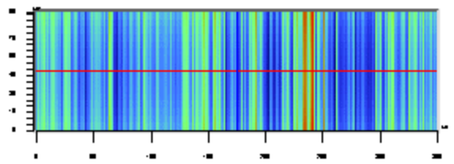
Rq: 4.13 A

Rt: 31.67 A

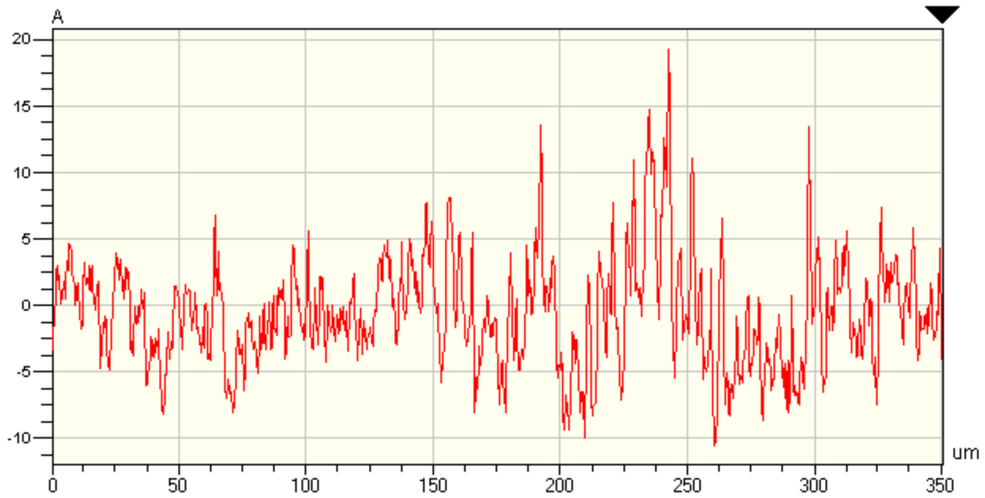
Rz: 26.22 A

Rsk: 0.74

Rku: 4.64



X Profile



Rq	4.09 A
Ra	3.12 A
Rt	29.67 A
Rp	19.23 A
Rv	-10.45 A

Angle	-0.32 urad
Curve	-0.88 km
Terms	None
Avg Ht	-0.60 A
Area	-0.02 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_C_2

position_C_21.gif

Date: 05/20/2005

Time: 11:32:10

PC TOPO-2D

Veeco

Ra: 3.23 A

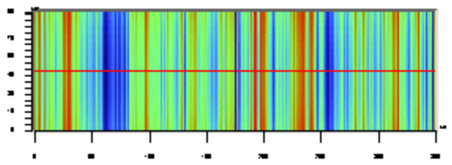
Rq: 4.12 A

Rt: 23.46 A

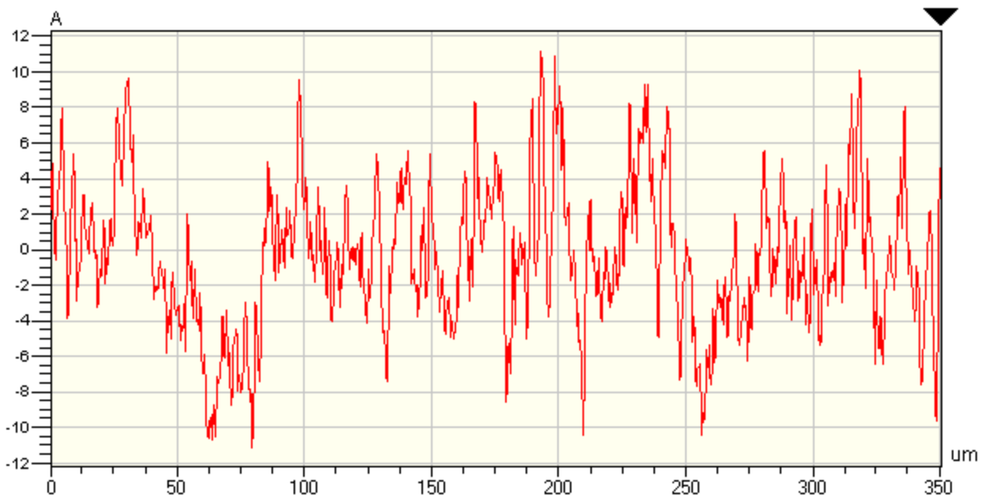
Rz: 21.74 A

Rsk: 0.12

Rku: 2.99



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_C_3

Rq	4.10 A
Ra	3.21 A
Rt	22.23 A
Rp	11.15 A
Rv	-11.08 A

Angle	0.14 urad
Curve	-1.90 km
Terms	None
Avg Ht	-0.38 A
Area	-0.01 um2

position_C_31.gif

Date: 05/20/2005

Time: 12:35:43

PC TOPO-2D

Veeco

Ra: 3.57 A

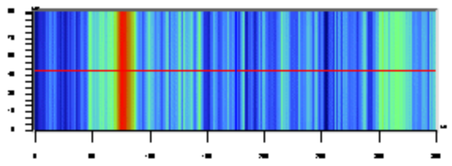
Rq: 5.01 A

Rt: 33.41 A

Rz: 29.97 A

Rsk: 1.54

Rku: 7.13



X Profile

Rq	5.01 A
Ra	3.57 A
Rt	33.15 A
Rp	23.04 A
Rv	-10.11 A

Angle	3.76 urad
Curve	1.66 km
Terms	None
Avg Ht	0.08 A
Area	0.00 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_D_1

position_D_11.gif

Date: 05/20/2005

Time: 12:36:37

PC TOPO-2D

Veeco

Ra: 2.45 A

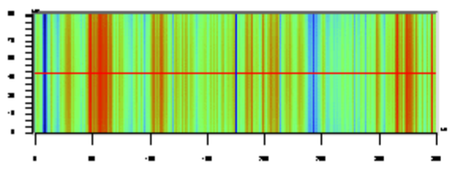
Rq: 3.21 A

Rt: 24.46 A

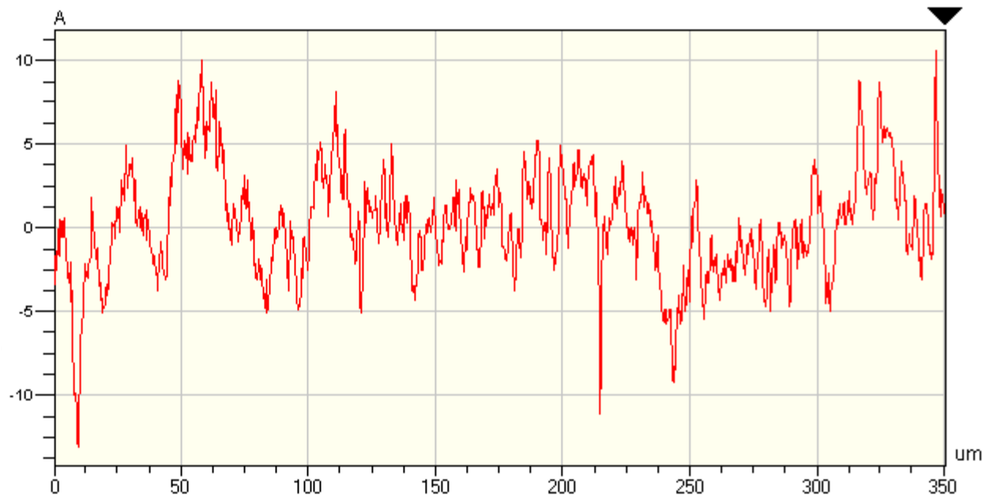
Rz: 20.75 A

Rsk: -0.07

Rku: 4.01



X Profile



Rq	3.20 A
Ra	2.44 A
Rt	23.60 A
Rp	10.57 A
Rv	-13.03 A

Angle	1.55 urad
Curve	1.50 km
Terms	None
Avg Ht	0.25 A
Area	0.01 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_D_2

position_D_21.gif

Date: 05/20/2005

Time: 12:37:49

PC TOPO-2D

Veeco

Ra: 2.12 A

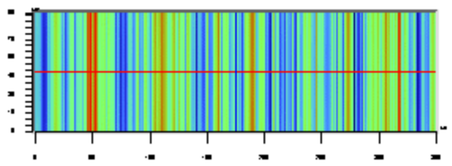
Rq: 2.70 A

Rt: 16.94 A

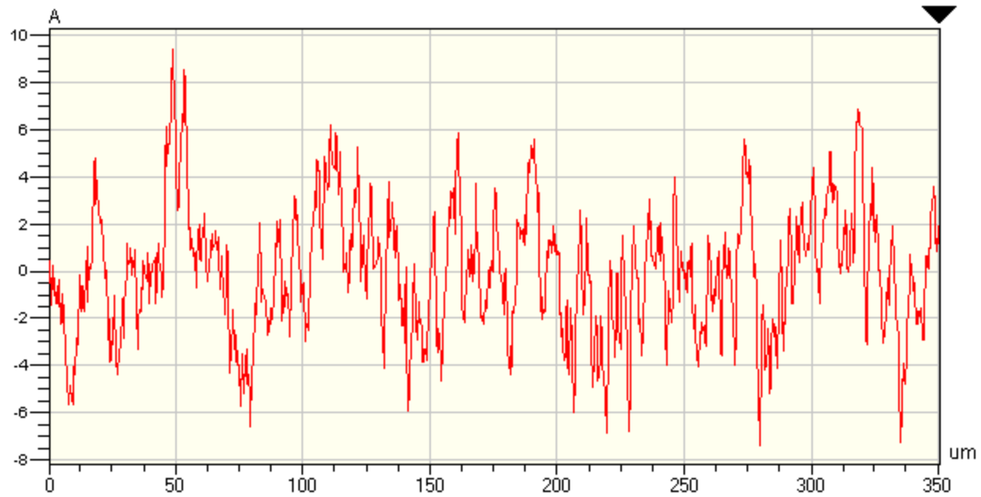
Rz: 15.22 A

Rsk: 0.22

Rku: 3.15



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_D_3

Rq	2.70 A
Ra	2.12 A
Rt	16.75 A
Rp	9.40 A
Rv	-7.35 A

Angle	0.75 urad
Curve	22.19 km
Terms	None
Avg Ht	-0.06 A
Area	-0.00 um2

position_D_31.gif

Date: 05/20/2005

Time: 12:38:33

PC TOPO-2D

Veeco

Ra: 3.43 A

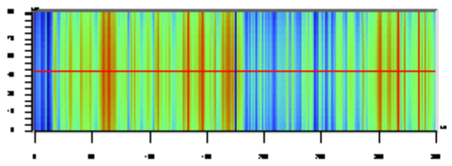
Rq: 4.35 A

Rt: 27.48 A

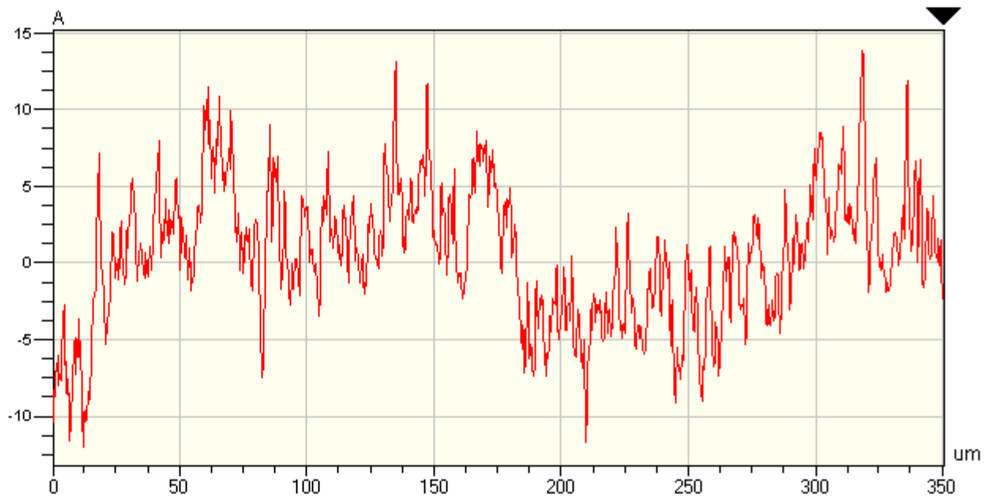
Rz: 24.94 A

Rsk: -0.03

Rku: 2.99



X Profile



Rq	4.32 A
Ra	3.41 A
Rt	25.77 A
Rp	13.85 A
Rv	-11.92 A

Angle	2.18 urad
Curve	1.83 km
Terms	None
Avg Ht	0.52 A
Area	0.02 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_E_1

position_E_11.gif

Date: 05/20/2005

Time: 12:39:32

PC TOPO-2D

Veeco

Ra: 3.32 A

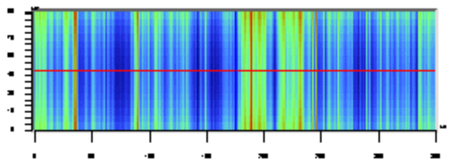
Rq: 4.29 A

Rt: 32.00 A

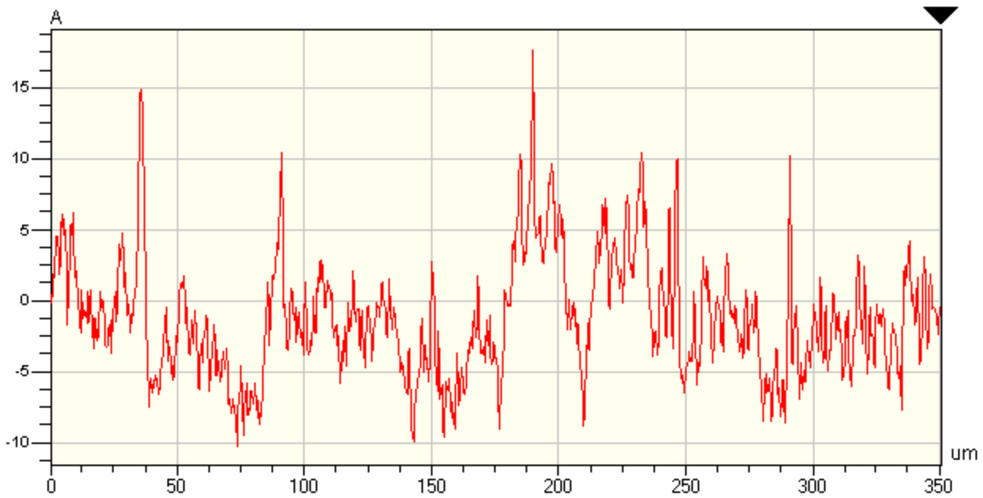
Rz: 26.23 A

Rsk: 0.68

Rku: 3.89



X Profile



Rq	4.09 A
Ra	3.14 A
Rt	27.83 A
Rp	17.63 A
Rv	-10.20 A

Angle	-0.30 urad
Curve	-0.50 km
Terms	None
Avg Ht	-1.27 A
Area	-0.04 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_E_2

position_E_21.gif

Date: 05/20/2005

Time: 12:40:20

PC TOPO-2D

Veeco

Ra: 3.06 A

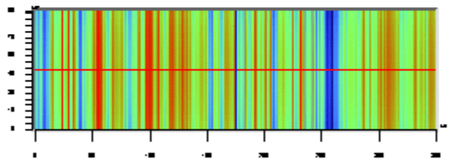
Rq: 3.84 A

Rt: 23.74 A

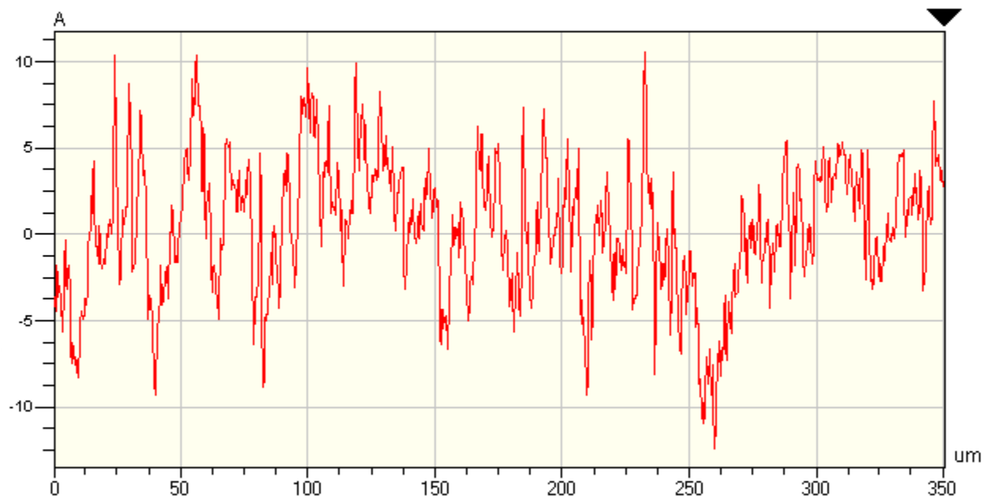
Rz: 21.38 A

Rsk: -0.22

Rku: 3.00



X Profile



Rq	3.83 A
Ra	3.05 A
Rt	22.89 A
Rp	10.53 A
Rv	-12.36 A

Angle	1.88 urad
Curve	-10.01 km
Terms	None
Avg Ht	0.28 A
Area	0.01 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: Difference

Note:

position_E_31.gif

Date: 05/20/2005

Time: 12:41:06

PC TOPO-2D

Veeco

Ra: 3.38 A

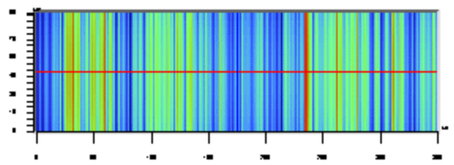
Rq: 4.29 A

Rt: 29.35 A

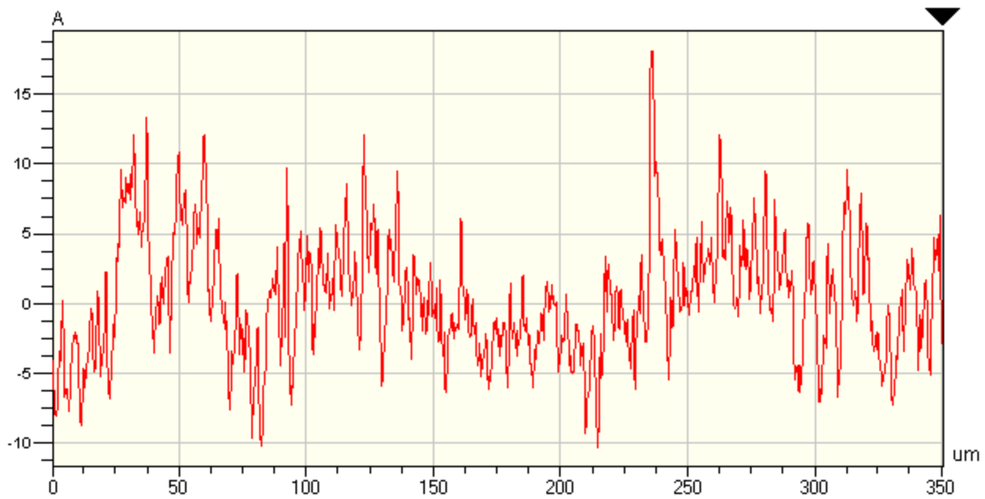
Rz: 24.68 A

Rsk: 0.48

Rku: 3.52



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_F_1

Rq	4.28 A
Ra	3.37 A
Rt	28.33 A
Rp	18.08 A
Rv	-10.25 A

Angle	0.29 urad
Curve	1.29 km
Terms	None
Avg Ht	0.31 A
Area	0.01 um2

position_F_11.gif

Date: 05/20/2005

Time: 12:41:50

PC TOPO-2D

Veeco

Ra: 2.65 A

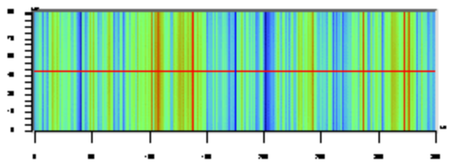
Rq: 3.33 A

Rt: 26.81 A

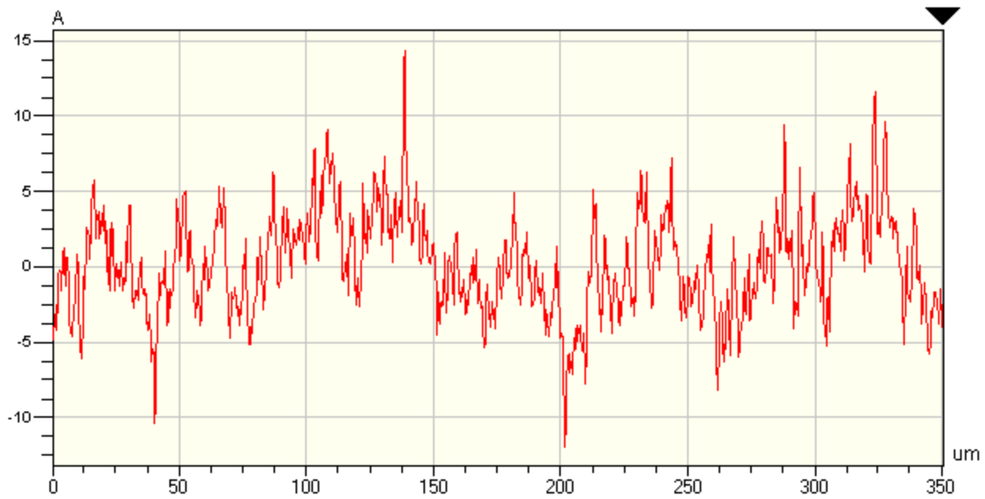
Rz: 21.67 A

Rsk: 0.24

Rku: 3.61



X Profile



Rq	3.32 A	Angle	-0.04 urad
Ra	2.65 A	Curve	4.16 km
Rt	26.19 A	Terms	None
Rp	14.31 A	Avg Ht	0.18 A
Rv	-11.88 A	Area	0.01 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_F_2

position_F_21.gif

Date: 05/20/2005

Time: 12:42:43

PC TOPO-2D

Veeco

Ra: 3.21 A

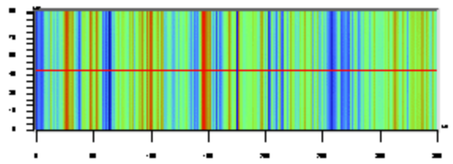
Rq: 4.04 A

Rt: 26.59 A

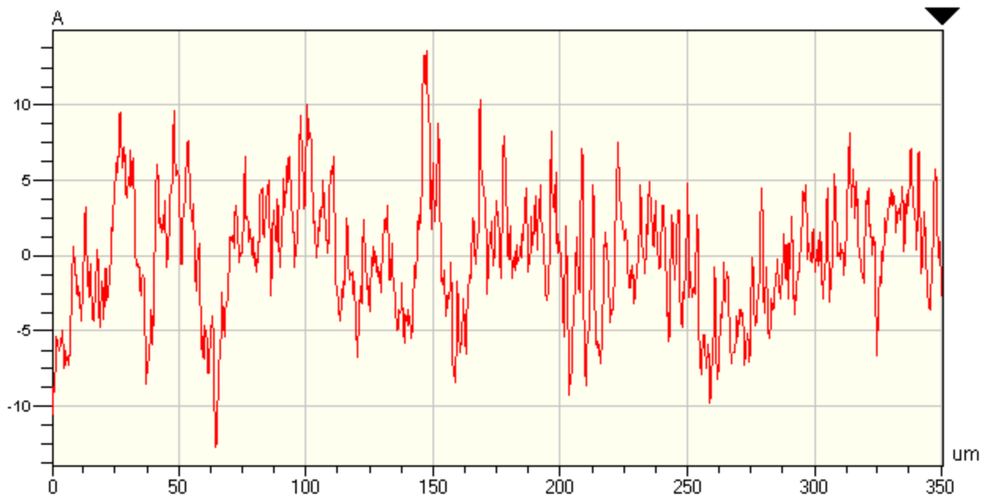
Rz: 22.04 A

Rsk: 0.05

Rku: 3.06



X Profile



Rq	4.04 A
Ra	3.21 A
Rt	26.23 A
Rp	13.59 A
Rv	-12.64 A

Angle	2.17 urad
Curve	2.65 km
Terms	None
Avg Ht	-0.10 A
Area	-0.00 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_F_3

position_F_31.gif

Date: 05/20/2005

Time: 12:43:29

PC TOPO-2D

Veeco

Ra: 3.04 A

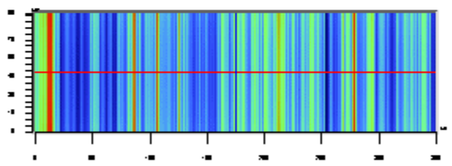
Rq: 4.09 A

Rt: 26.34 A

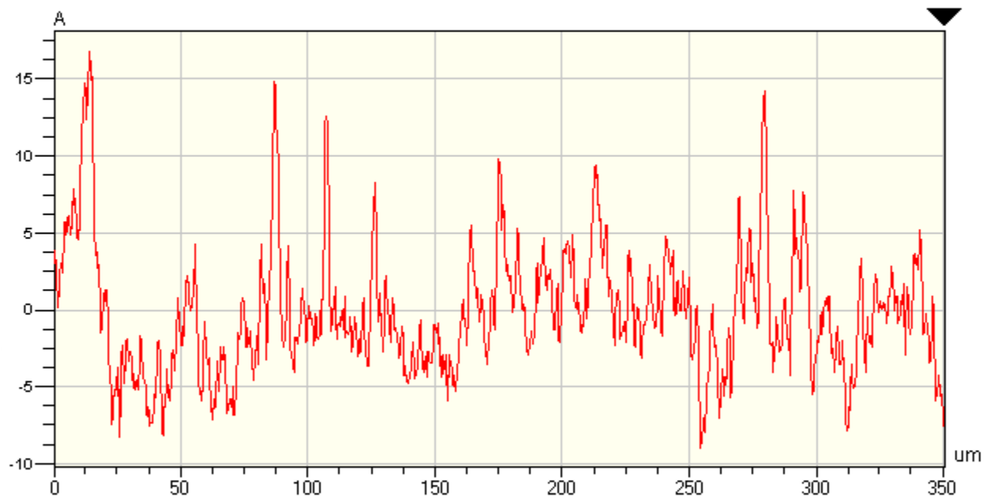
Rz: 23.72 A

Rsk: 1.05

Rku: 4.95



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_G_1

Rq	4.08 A
Ra	3.04 A
Rt	25.70 A
Rp	16.78 A
Rv	-8.91 A

Angle	-3.15 urad
Curve	-1.14 km
Terms	None
Avg Ht	-0.17 A
Area	-0.01 um2

position_G_11.gif

Date: 05/20/2005

Time: 12:44:12

PC TOPO-2D

Veeco

Ra: 2.53 A

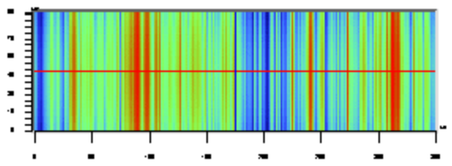
Rq: 3.24 A

Rt: 19.49 A

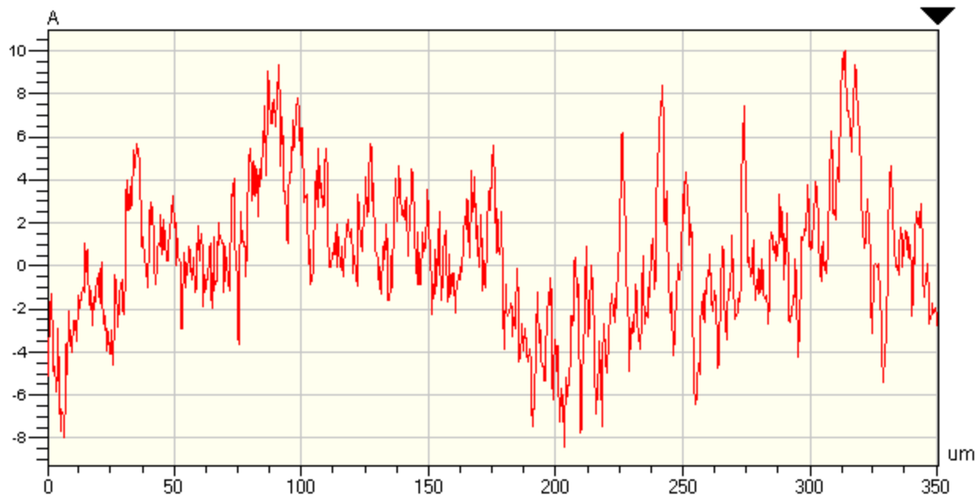
Rz: 17.90 A

Rsk: 0.24

Rku: 3.16



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_G_2

Rq	3.23 A
Ra	2.51 A
Rt	18.34 A
Rp	9.99 A
Rv	-8.36 A

Angle	0.83 urad
Curve	2.41 km
Terms	None
Avg Ht	0.33 A
Area	0.01 um2

position_G_21.gif

Date: 05/20/2005

Time: 12:45:19

PC TOPO-2D

Veeco

Ra: 4.20 A

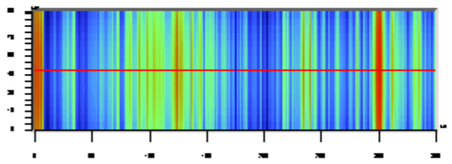
Rq: 5.38 A

Rt: 33.00 A

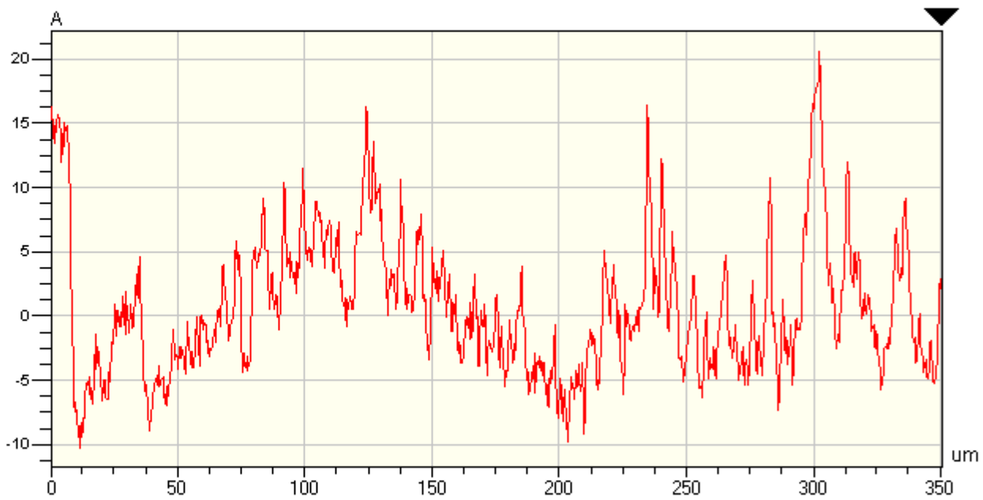
Rz: 28.33 A

Rsk: 0.89

Rku: 3.72



X Profile



Rq	5.34 A	Angle	-3.52 urad
Ra	4.17 A	Curve	0.78 km
Rt	30.78 A	Terms	None
Rp	20.58 A	Avg Ht	0.70 A
Rv	-10.20 A	Area	0.02 um2

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_G_3

position_G_31.gif

Date: 05/20/2005

Time: 12:46:09

PC TOPO-2D

Veeco

Ra: 3.32 A

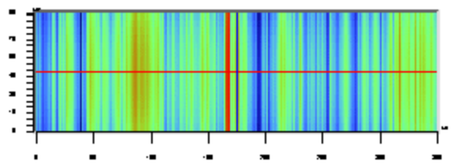
Rq: 4.25 A

Rt: 32.58 A

Rz: 26.16 A

Rsk: 0.33

Rku: 3.98



X Profile

Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_H_1

Rq	4.22 A
Ra	3.29 A
Rt	30.87 A
Rp	18.34 A
Rv	-12.54 A

Angle	0.71 urad
Curve	1.23 km
Terms	None
Avg Ht	0.51 A
Area	0.02 um2

position_H_11.gif

Date: 05/20/2005

Time: 12:47:00

PC TOPO-2D

Veeco

Ra: 2.72 A

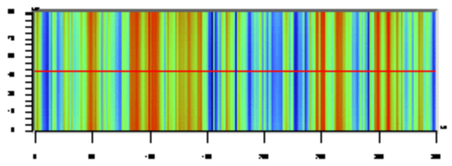
Rq: 3.32 A

Rt: 17.83 A

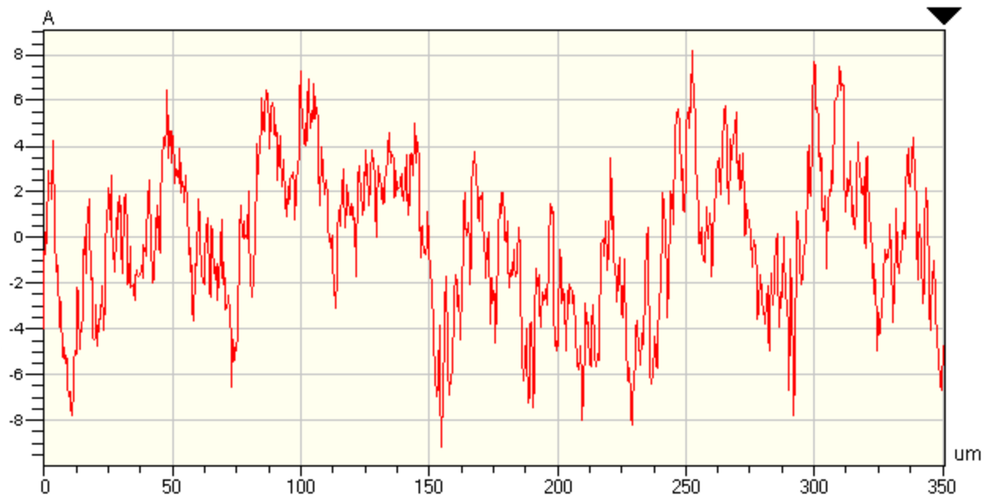
Rz: 16.26 A

Rsk: -0.07

Rku: 2.47



X Profile



Terms Removed: Curvature & Tilt

Magnification: 40.91

Wavelength: 650.00 nm

Title: 4ITM01

Note: Position_H_2

Rq	3.31 A
Ra	2.72 A
Rt	17.29 A
Rp	8.17 A
Rv	-9.12 A

Angle	-0.37 urad
Curve	-1.48 km
Terms	None
Avg Ht	-0.18 A
Area	-0.01 um2

position_H_21.gif