**Profilometer-Bruker Contour GT-I**

**Basic Operation Instruction**

**Warning:**

1. Ensure that there is no object on the scanning stage before setting up the microscope.
2. There must be enough space between lens and stage to set up the sample.
3. Use the glass plate to prevent dirt on the stage when handling small samples.
4. Don’t forget to log off from the FOM after finishing.

**Procedure**

1. **Starting**
2. **Measurement Set up**

VSI/VXI measurement (Rough sample- 0.3-5nm)

PSI measurement (Smooth sample- step height <0.3nm)

1. **Looking for fringes and optimize fringes (Focus the sample)**
2. **Measurement and data analysis**
3. **Saving the Data**
4. **Changing the sample**
5. **Finishing**

**I. Starting**

* Open the software Graphical user interface

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* Wait for the initialization of the stage and follow the instructions.

Graphical user interface, text

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Overview of the screen

Graphical user interface, application, PowerPoint

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1. Tool bar- To set up overall system configurations.
2. Measurement - To commend the system using measurement parameters.
3. Live video- To find the fringes and adjust the fringes.
4. Instrument control-To control XY position, Z position, Tip and Tilt, and light intensity.

Note: We can control the XY position, Z position, and Tip and Tilt using control box. We can also use the light control box.

* Turn on the control box. (Don’t turn off the control box after completing the test).
* Set up the sample on the stage.

**VSI/VXI measurement (Rough sample- 0.3-5nm)**

**II. A. Measurement Set up**

* **Measurement**-Choose **VSI/VXI**
* Start with the objective lens 5x and field of view lens 1.0X.
* Click on **Measurement, and** choose **Measurement Parameters**

1. Speed-1X
2. Back scan and Length – Choose 20um and 50um, respectively. The total movement of the objective lens will be 70um. Depends on sample step height.
3. Threshold- Use between 7-15% .
4. Illumination- Check **Use default** (white for VSI measurement)
5. Average- Check **Average** and choose 2 or 3 as you desire.
6. Check **Enable** (End scan 5um after 90%) to save time.
7. Processing method- Choose Type **VSI**

**III A. Looking for fringes and optimize fringes.**

Note: Fringes are localized around the best focus.

**Looking for fringes**

* Turn on the auto intensity to see the sample.
* Control the sample position using a control box or mouse on **Instrument Control** area.

3 options to move the sample using fast, Medium and slow speed. Graphical user interface

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Z profile is for X direction. Pull up/down the red dot to away/close to the sample.

X profile is for X direction and Y profile is for Y direction. Pull the red dot to X or Y direction.

* Go to edge of the sample to adjust the focus of the image. Can see the fringes when the image is on sharp focus.
* Double click the point that you want to measure. That area will be moved into the center of the crosshair line.
* When you get fringes, change the objective lens and field of view lens to get desired magnification.

**Optimize fringes**

Note: The white light, Zero order fringes are the highest contracts.

* Use red dot in Tip Tilt to rotate and adjust the number of the fringes.
* Fringes should be perpendicular position. (Spin Red dot in **Tip Tilt** to get the right position).
* Standard fringes number-3 to 5 Nos.(Pull the red dot up direction to shrink the fringes and down direction to expand the fringes).
* Redo **Auto Intensity**.

**IV. Measurement and data analysis (Term removal, Step height)**

* Click on **Measurement** on Tool bar.

|  |  |
| --- | --- |
| You can see Surface height, Data and Grayscale Data in **Data analyzer** (Right side of the screen)   * Click on **Data**. * Choose **Term Removal (F-operator)** under 3D Filter from **Analysis Toolbox (**Bottom Right side of the screen**)** * Choose **Step Height** under **3D analysis** section from **Analysis Toolbox** | Graphical user interface, text, application, chat or text message  Description automatically generated |

* **Data Analysis** screen will come up under Instrument setting.

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*Note: Adjust the measurement line using arrow that you want.*

**1. Edit Mask**

* Right click on **Term Removal (F-operator).**
* Choose **Edit settings.**
* **Term Removal** box will come up**.**
* Choose **Tilt only** (Plane fit)**.** Click **Edit Mask.**
* Select the tool shape>select the region> make the region on the image.

Click on Mask, invert Mask then click on OK.

A screenshot of a computer

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**2. *Step Height measurement*** -Click on **Step height** toget the results.

**V. Saving the Data**

* Save the file in C:\Program Data\Bruker\Vision\Data\Your Folder
* ***To save 3D profile file***

Click on A picture containing graphical user interface

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* ***To save*** analysis and measurement parameters

Click on **Save** button, choose **Vision Recipe**. If the below window will pop up

Graphical user interface, text

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* Save in C:\Program Data\Bruker\Vision\Recipes\Vision\Your Folder.

Save the data with (\*.visrcp) type.

Recommend: After getting all results, transfer your results to **DATA\_ Share$ Folder**.

Use MMCL server computer in room **532b** to get your data by Flash drive. Password (532b).

**VI. Changing the sample**

1. Click on **Measurement Setup** in the Tool bar.
2. Change the Lens 5X.
3. Pull up the Red arrow in Z axis using Fast speed and to get enough space between lens and stage to remove the sample and to set up the new sample.
4. Change the sample.
5. **Finishing**
6. Click on **Measurement Setup** in the Tool bar.
7. Change the Lens 5X.
8. Pull up the red arrow in Z axis using Fast speed and to get enough space between lens and stage to remove the sample.
9. Make sure save the results before exit the program.
10. Exit the program.
11. Take the sample and clean the stage.
12. Turn off the light box.
13. Don’t turn off the control box after completing the test.
14. Log out from the FOM.

Log in to MMCL server computer and get your results from **Data Share$ Folder.**

Analysis Software - **Gwydion**

**PSI measurement (Smooth sample- <0.3nm)**

**II B. Measurement Set up**

* Measurement-Choose **PSI**
* Start with the objective lens 5x and field of view lens 1.0X.
* **Measurement parameters**

Threshold- 7%

Illumination- Check **Use default** (Green for PSI measurement)

Average- Can choose 2 or 3 as you want.

Phase Unwrapping-Choose Standard

**III B. Looking for fringes and optimize fringes (Focus the sample)**

**Looking for fringes**

* Turn on the auto intensity to see the sample.
* Control the sample position using a control box or mouse on **Instrument Control** area.
* Go to edge of the sample to adjust the focus of the image. Can see the fringes when the image is on sharp focus.
* Double click the point that you want to measure. That area will be moved into the center of the crosshair line.

When you get a sharp image, change the objective lens and field of view lens to get desired magnification.

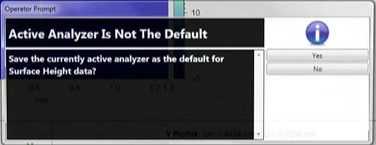
**Optimize fringes**

Note: Try to get Zero order fringe (White light). In green light, there are many fringes, and all fringes look similar. It is hard to find Zero order fringe.

* Use red dot in Tip Tilt to rotate and adjust the number of the fringes.
* Use Green light first to find fringes and then change White light to find Zero order fringes.
* Illumination- Remove check **Use default** and change white, redo auto intensity.
* Then check **Use default** and choose Green (narrow band), redo auto intensity.
* Fringes should be perpendicular position. (Spin Red dot in **Tip Tilt** to get the right position).
* Standard fringes number –1 white (Pull the red dot up direction to shrink the fringes and down direction to expand the fringes).
* Redo **Auto Intensity**.

***Multiple measurement***

* Go to **Analyze** in Menu bar, Click on **Setup** in Tool bar.
* Database Setup box will come up.
* Click on down arrow in **Create** and choose **Blank.**
* Name the file and save with CVS type.
* Save in C:\Program Data\Bruker\Vision\Database\Your Folder. Click on **Save**.
* Choose **Ra, Rq** in **Basic Stats** and **Sequence Number** and **Time stamp** in Meta Data.
* Check **Overwrite Current Database**. Click **Save All.**

. Click Yes.

* Save in C:\Program Data\Bruker\Vision\Recipes\Vision\Your Folder.
* Save the file with (\*.visrcp) type. Click on Save.
* Go to **Instrument** in Menu bar, choose **Measurement Setup** in Tool bar.
* Choose **Auto loop** -3- in **Settings** under **Measurement** section.
* Click on **Measurement** on the Tool bar. Wait for progress.

Text

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