OPTIKA®
ITALY

SW PRO MET

INSTRUCTION MANUAL

Model
PRO MET Software

Ver. 1.0 2024

CE

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1. Warning

This microscope is a scientific precision instrument designed to last for many years with a minimum of maintenance. It is built to high optical and mechanical standards and to withstand daily use. We remind you that this manual contains important information on safety and maintenance, and that it must therefore be made accessible to the instrument users. We decline any responsibility deriving from incorrect instrument use uses that does not comply with this manual.

2. Safety Information

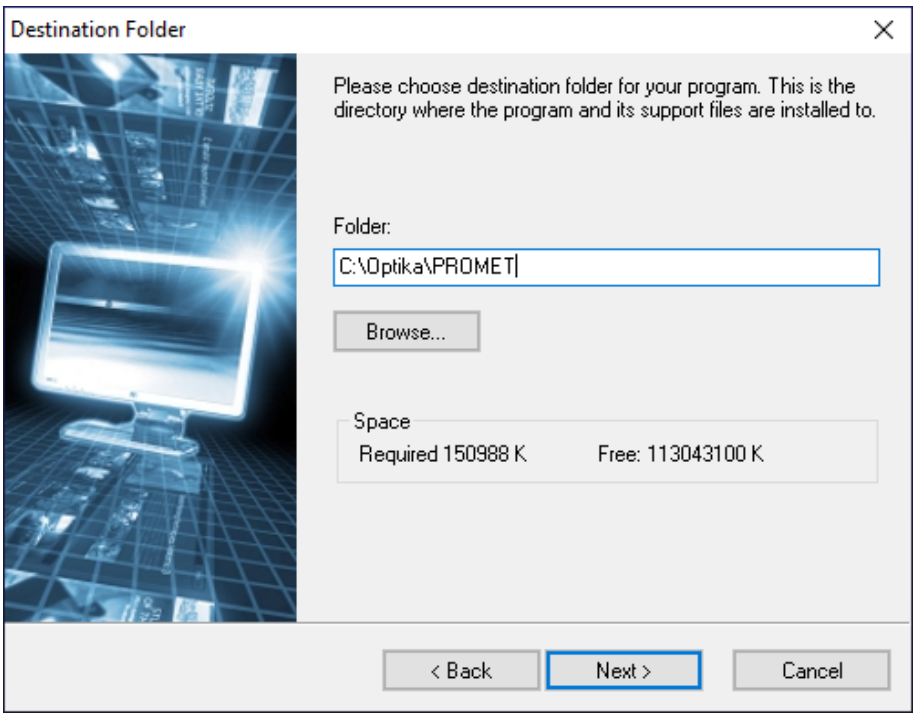
Avoiding Electrical Shock

Before plugging in the power supply, make sure that the supplying voltage of your region matches with the operation voltage of the equipment and that the lamp switch is in off position. Users should observe all safety regulations of the region. The equipment has acquired the CE safety label. However, users have full responsibility to use this equipment safely. Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.

3. Installing the software

3.1 Install the software

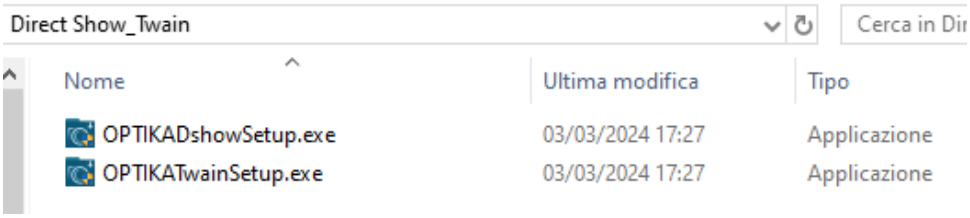
1. Run the setup.exe file from the main folder.
2. You will be prompted to enter the destination folder. Select C:\Optika\PROMET.



3. Click on Next. Installation will begin.
4. At the end system is ready to be launched.

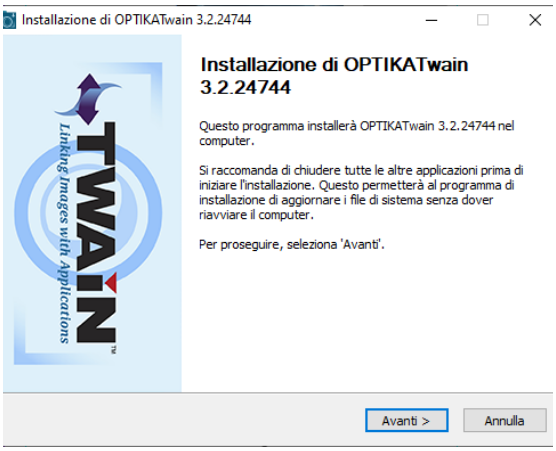
3.2 Installing TWAIN source

1. Download the TWAIN setup file from the the path: https://www.optikamicroscopes.com/directshowandtwainconnection.zip
2. Extract the folder.
3. The folder contains the following elements:



4. Double click on the item “OPTIKATwainSetup.exe”.

5. In the following dialog click “Yes”. The following dialogue box appears:



6. Click on “Next”.
7. Accept the default installation folder and click on “Install”.
8. Once installed the “installation completed” message will appear.
9. Click on “Close”.

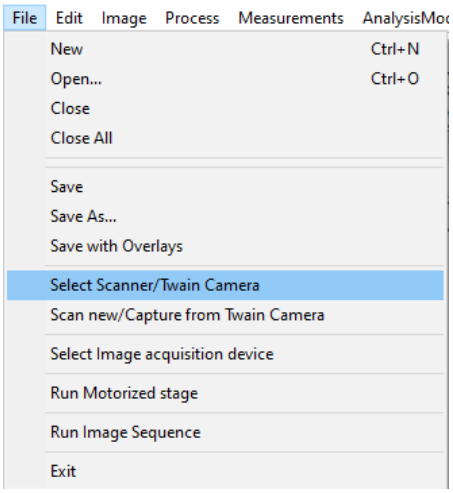
Minimum System Requirements:

CPU: 1.7 GHz
RAM: 4 GB
Hard Disk: 800GB
OS: Windows 10 (64 Bit)
USB: 3 x USB2.0, 1 x USB3.0

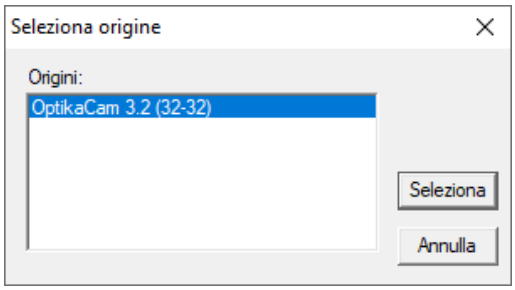
4. Image Capture

4.1 Image preview

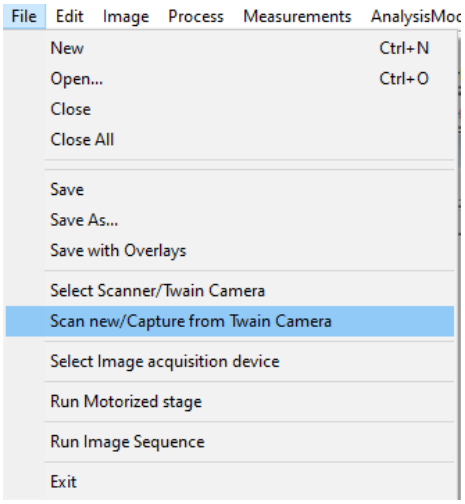
1. After opening the Software, click “File”, then click on “Select Scanner/Twain Camera”.

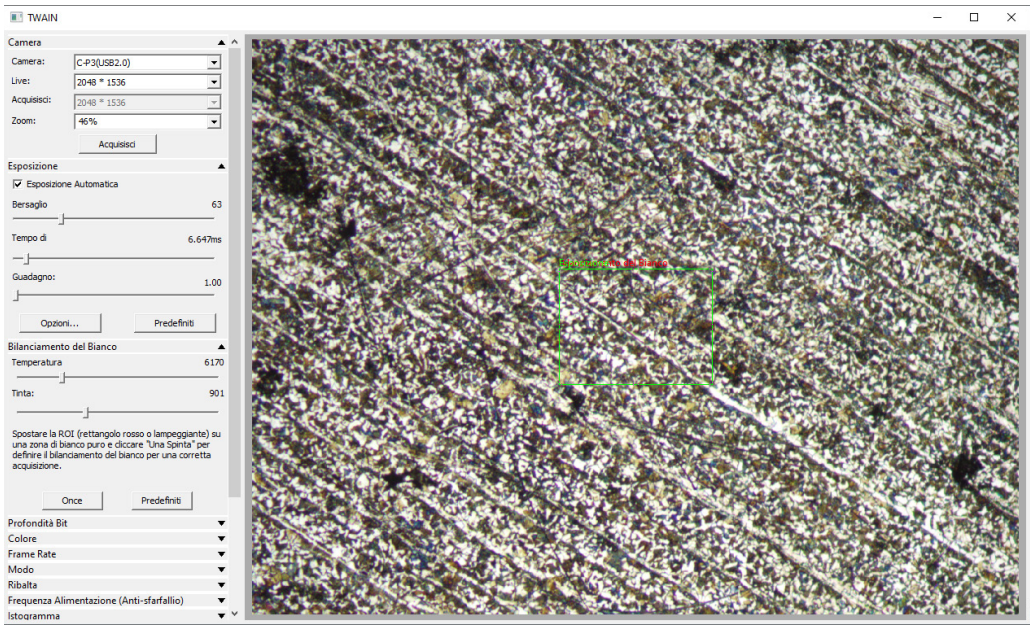


2. The “Select Source” dialog box containing the list of available cameras will appear.

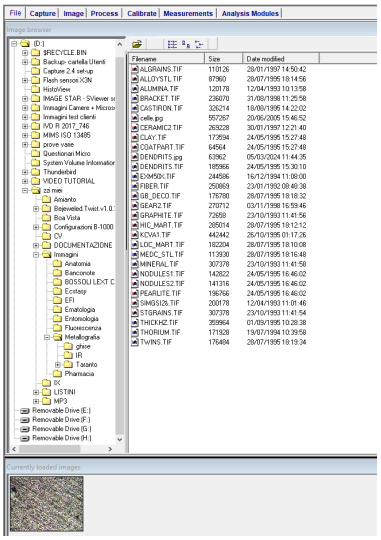


3. Click on camera model you want to use (e.g., “OptikaCam 3.2”) and click “Select”.
4. Click “File”, then click on “Scan new/Capture from Twain Camera”. Live image will appear.





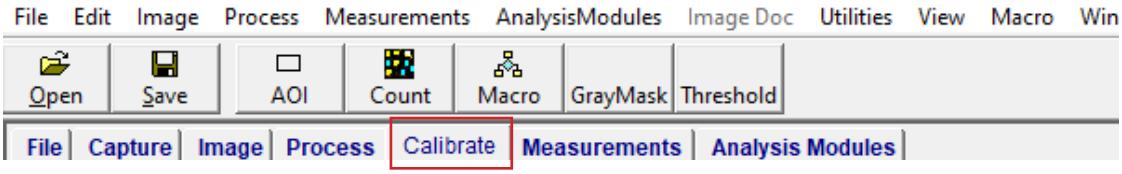
5. Set the camera parameters according to personal preferences, then click on “Snap”.
6. The thumbnail of the captured image will be shown in “Currently loaded images” section in the bottom of the screen.



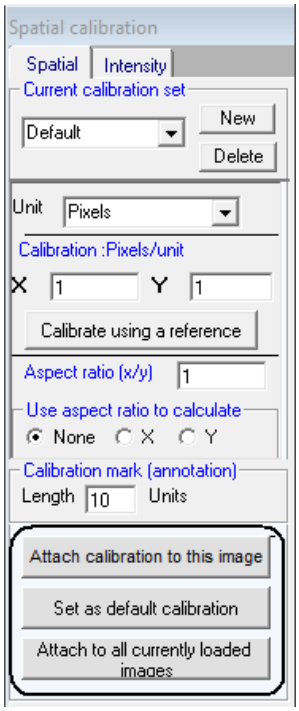
7. Image can be saved using “File > Save as...”.

4.2 Calibration

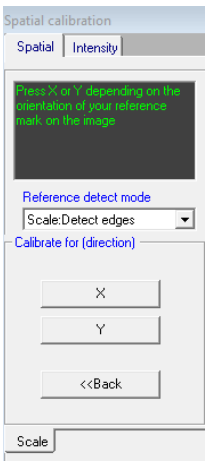
1. Start the live image as explained in Chapter 4.1.
2. Insert lowest magnification objective in the light path (e.g. 5x)
3. Put on the microscope stage a calibration slide and focus with the microscope focus knobs until the scale is clearly focused on the screen.
4. Snap the image.
5. From “Currently loaded images” section click the image in order to show it on the screen.
6. Click on “Calibrate” on the top of the screen.



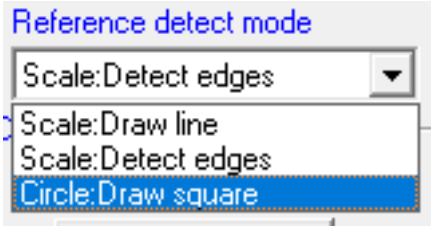
7. Calibration dialog will appear on the right side of the screen.



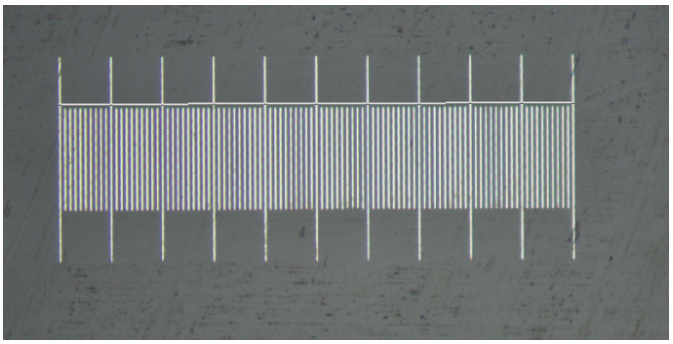
8. Select “Spatial”.
9. In the “Current calibration set” click on “New” and input the current magnification used (e.g. 5X)
10. In the “Unit” field” select “microns”.
11. In the “Calibration : Pixels/Unit” section leave “X = 1” and “Y = 1”. Then click on “Calibrate using a reference”
12. The calibration dialog changes:



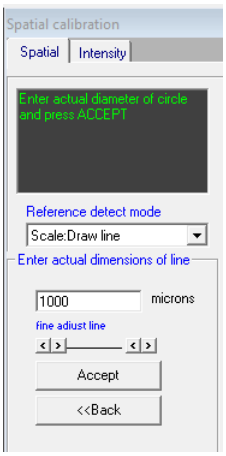
13. Here user can select among three different calibration methods:



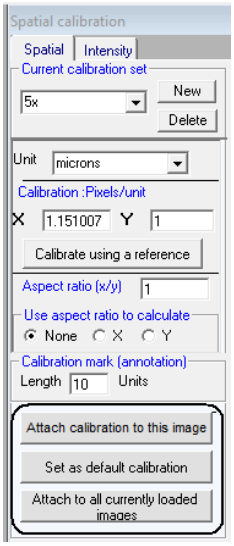
14. In this case we will use “Scale: Draw line” method.
15. In the “Calibrate for (direction)” select “X”. The mouse cursor will change shape (a “+” shape will appear allowing to draw a line along the scale).



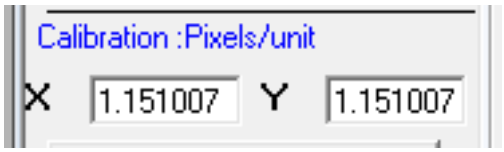
16. In the “Enter actual dimension of line” enter the lenght of the drawn line (in this example 1000 microns), then click on ”Accept”.



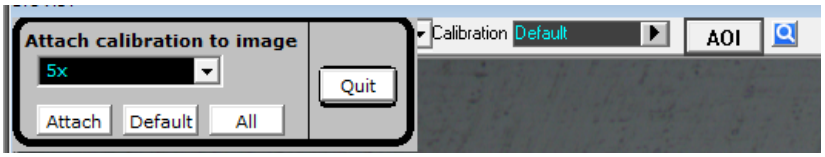
17. Then click on “Back”.
18. The dialog box will appear like this:



- The sensor pixel cell is square, therefore the “X” dimension is the same of the “Y” dimension. It is not needed to perform a new calibration in the “Y” direction. You can copy the value listed in the “X” field and paste in the “Y” field. Doing this the calibration will be applied both in X and Y directions.



19. At the end click on “Attach calibration to this image” and on “Set as default calibration”.
20. In the calibration list the “5x” value will be available for future measurements.



21. Repeat the same procedure for all the available objectives.

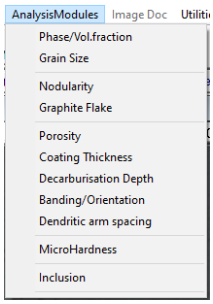
5. Analysis modules

5.1 Phase/Vol Fraction

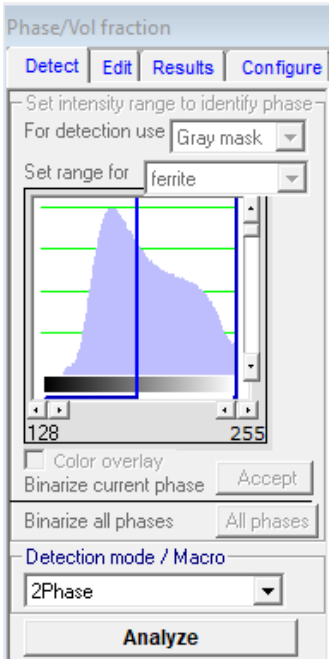
There are two different modes to analyze Phase/Vol Fraction.
- Manual Detection
- Automatic Detection

Mode n° 1: Manual detection

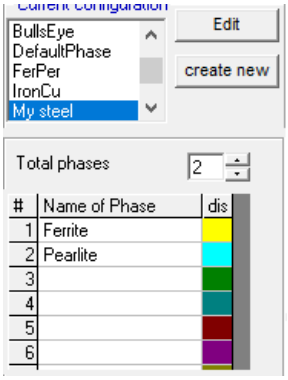
1. Select “Phase/Vol Fraction” from the AnalysisModules.



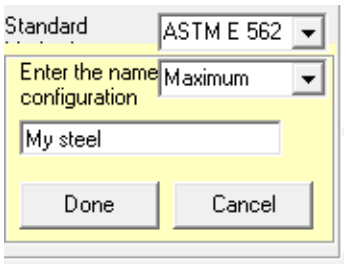
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. Select on “Configure” then click on “Edit” or “Create New” and enter the number of phases observed in the image.

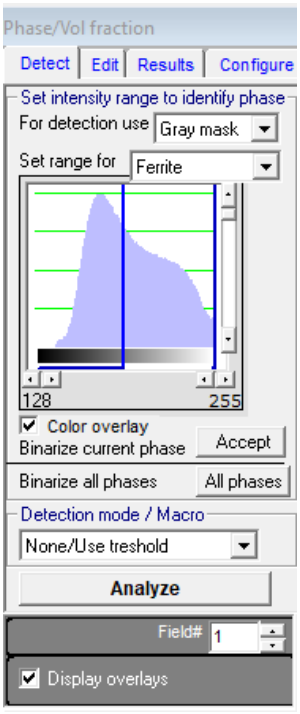


6. Then click on “Save” or “Save as”

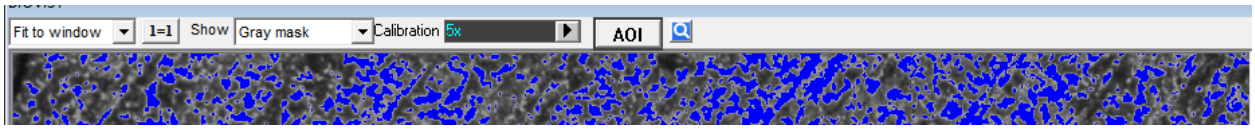


7. Input the name of the new configuration and click on ”Done”.

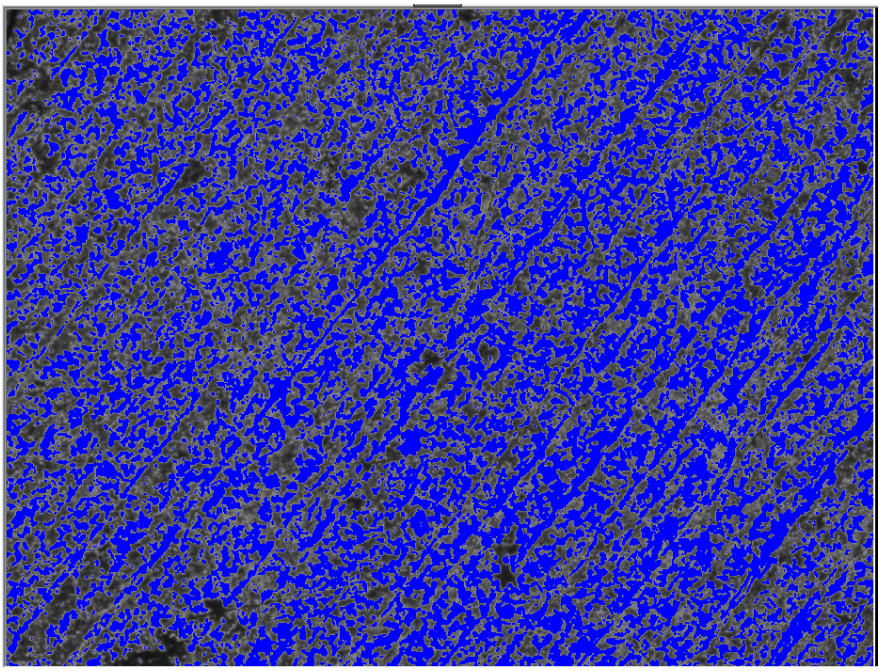
8. In the “Detect” section select the phase thresholding.
- As Detection mode / Macro use “None/Use threshold”
- Enable the checkbox “Color overlay”

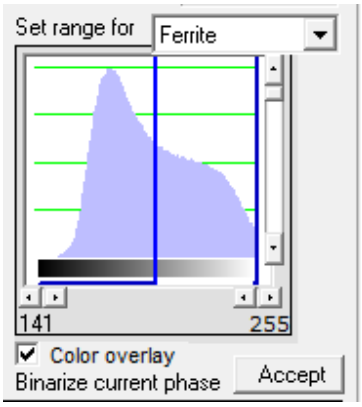


- In the main screen select “Grey mask”

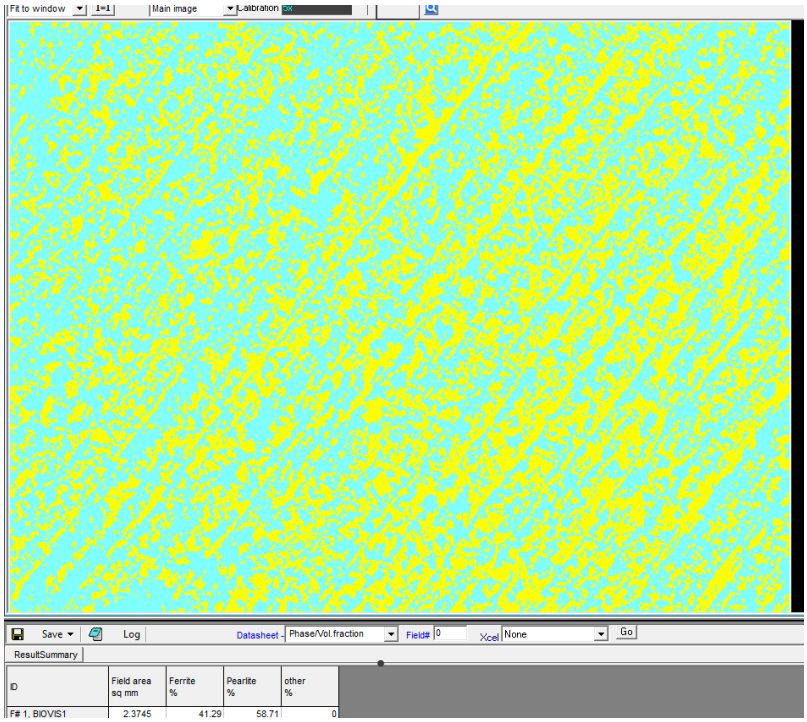


- Start the thresholding. The selected phase (e.g. “Ferrite”) will be displayed in false colors.





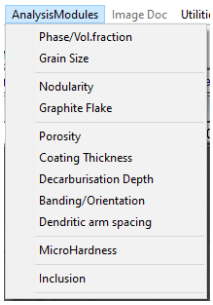
- Repeat the same for the other phase.
- Once threshold is done, click on “Analyze”. Image will be analyzed, phases will be displayed in the selected pseudocolors and the result sheet will be displayed in the bottom of the image.



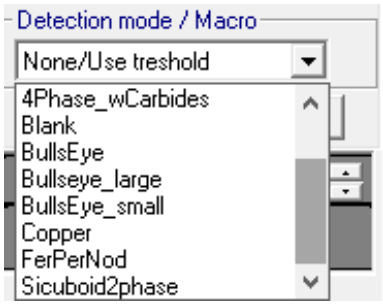
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, pseudocolored image and result sheet

Mode n° 2: Automatic detection

1. Select “Phase/Vol Fraction” from the AnalysisModules.



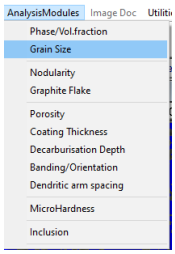
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. In the “Detection mode / Macro” select a suitable macro for the specimen.



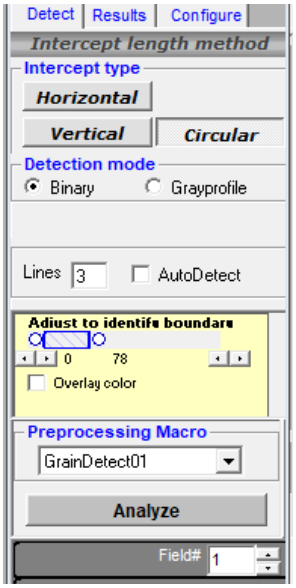
5. Click on “Analyze”.
6. Phase analysis will be automatically performed.

5.2 Grain Size

1. Select “Grain Size” from the AnalysisModules.



2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:

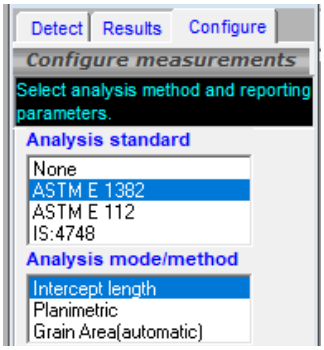


Click on “Configure”

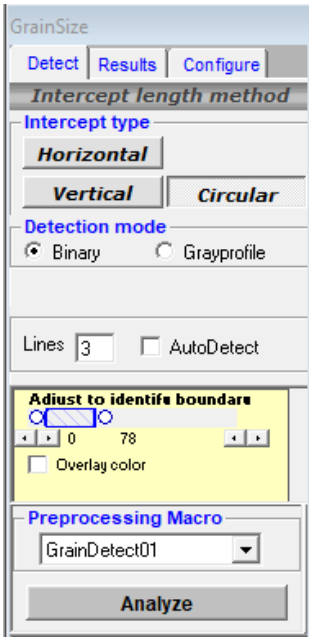
There are 3 different modes to analyze Grain Size particles
- Intercept Length
- Planimetric
- Grain Size (Automatic)

Mode n° 1: Intercept Lenght

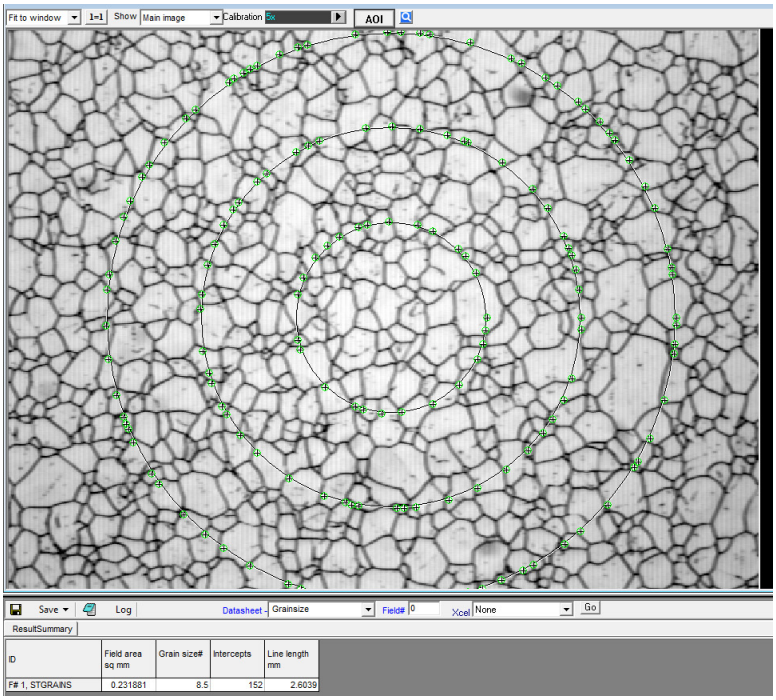
1. In the Analysis mode/method select “Intercept lenght”.



2. In the “Detect” section enter the number of lines you want to draw on the image and click on “Analyze”.



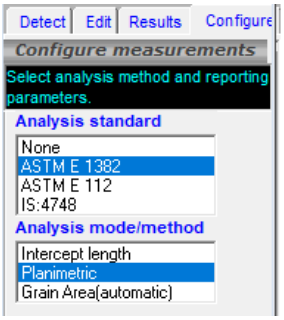
3. Analysis will be automatically performed (using some pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



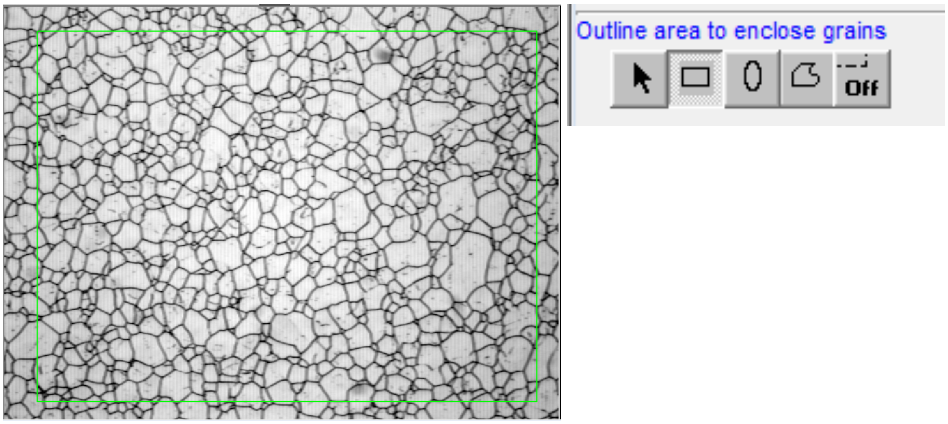
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, intercept overlay image and result sheet.

Mode n° 2: Planimetric

1. In the Analysis mode/method select “Planimetric”.

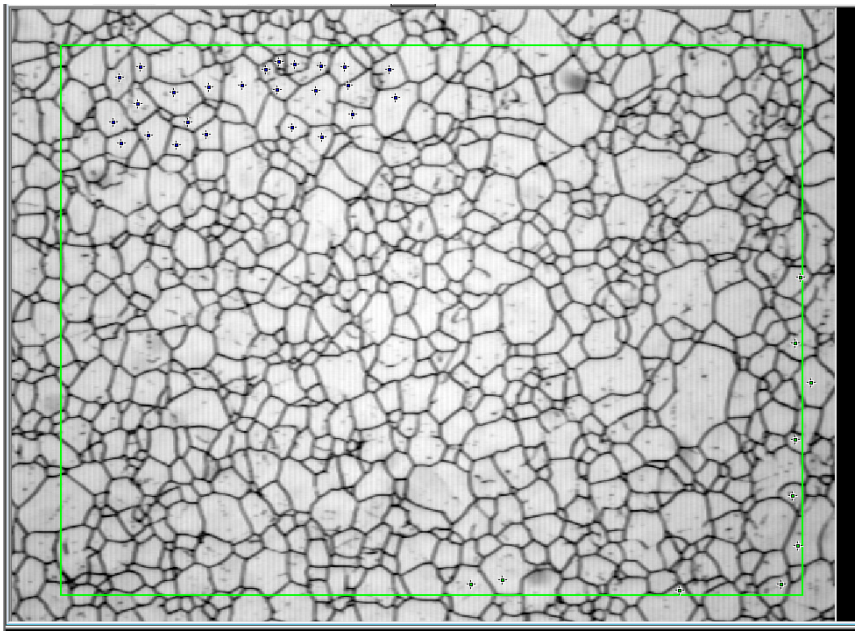


2. In “Detect” select an area inside the image that you want to outline.



3. Now tap the grains the field “Tag grains inside area”.

- “1” Stands for full grains in selected area.
- “½” stands for the grains intersected by the outline.

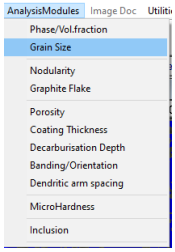


4. Once all the grains have been selected (1 or ½) click on “Analyze”.
5. The results will be shown in the bottom part of the screen

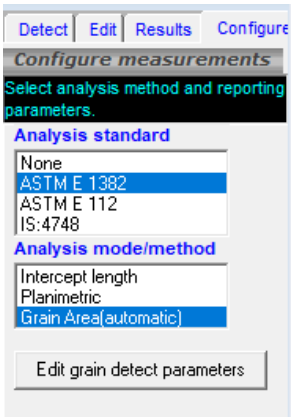
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, tagged grains image and result sheet.

Mode n° 3: Grain Area (Automatic)

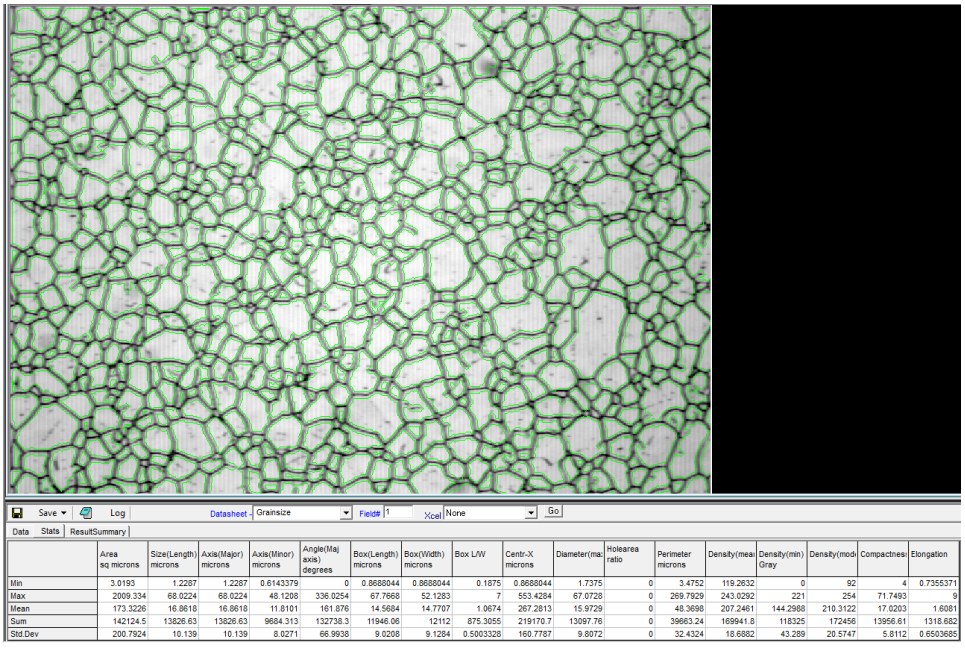
1. Select “Grain Size” from the AnalysisModules.



2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. In the Analysis mode/method select “Grain Area (automatic)”.



5. In “Detect” click on “Analyze”. Analysis will be automatically performed (using some pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.

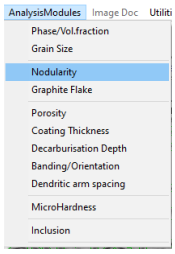


	Area sq microns	Size(Length) microns	Axis(Major) microns	Axis(Minor) microns	Angle(Maj axis) degrees	Box(Length) microns	Box(Width) microns	Box L/W	Centr-X microns	Diameter(ma	Holearea ratio	Perimeter microns	Density(mea	Density(min) Gray	Density(mod	Compactnes	Elongation
Min	3.0193	1.2287	1.2287	0.6143379	0	0.8688044	0.8688044	0.1875	0.8688044	1.7375	0	3.4752	119.2632	0	92	4	0.7355371
Max	2009.334	68.0224	68.0224	48.1208	336.0254	67.7668	52.1283	7	553.4284	67.0728	0	269.7929	243.0292	221	254	71.7493	9
Mean	173.3226	16.8618	16.8618	11.8101	161.876	14.5684	14.7707	1.0674	267.2813	15.9729	0	48.3698	207.2461	144.2988	210.3122	17.0203	1.6081
Sum	142124.5	13826.63	13826.63	9684.313	132738.3	11946.06	12112	875.3055	219170.7	13097.76	0	39663.24	169941.8	118325	172456	13956.61	1318.682
Std.Dev	200.7924	10.139	10.139	8.0271	66.9938	9.0288	9.1284	0.5003328	160.7787	9.8072	0	32.4324	18.6882	43.289	20.5747	5.8112	0.6503685

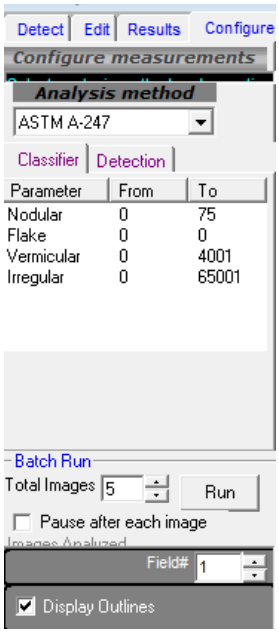
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined grains image and result sheet.

5.3 Nodularity

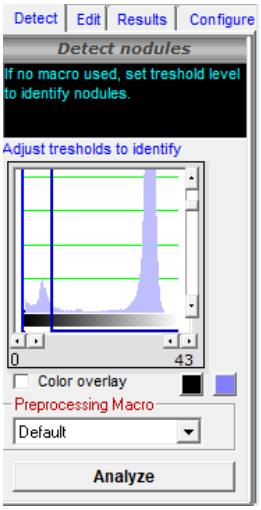
1. Select “Nodularity” from the AnalysisModules.



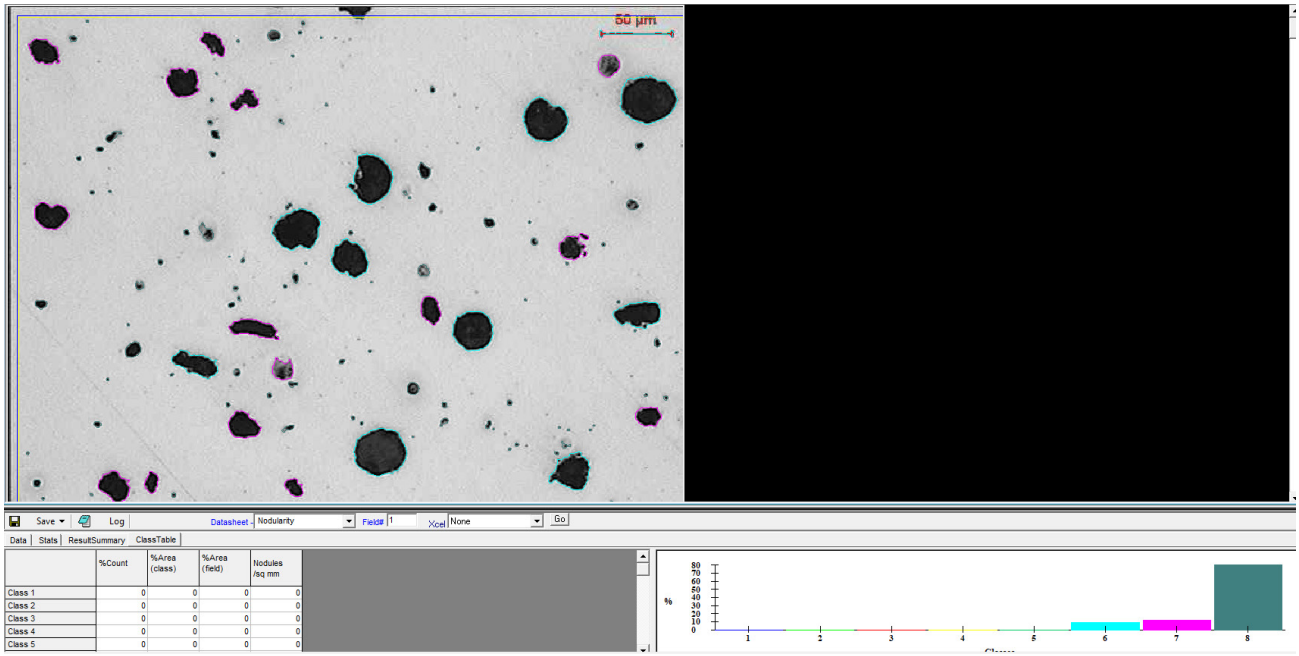
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.



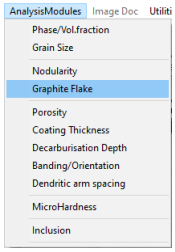
6. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and the result will be displayed at the bottom of the screen.



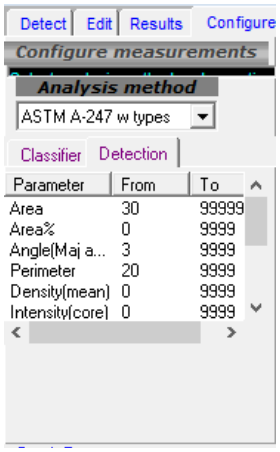
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined graphite nodules image and result sheet.

5.4 Graphite Flake

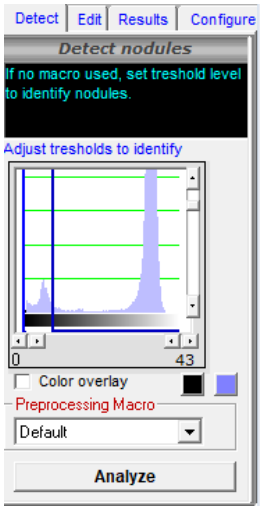
1. Select “Graphite Flake” from the AnalysisModules.



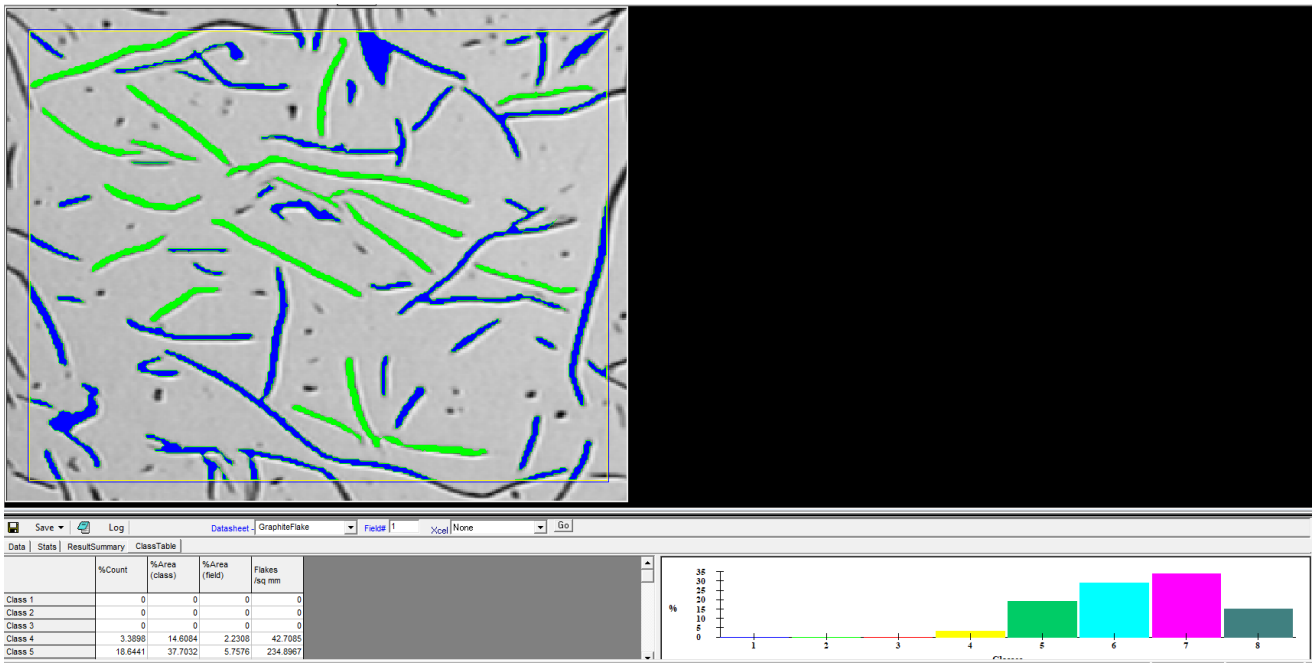
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.



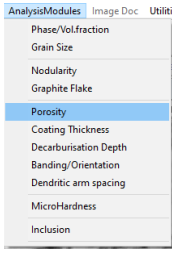
6. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and the result will be displayed at the bottom of the screen.



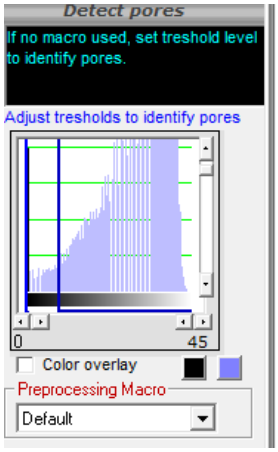
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined graphite flakes image and result sheet.

5.5 Porosity

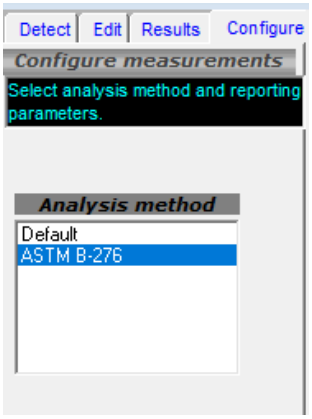
1. Select “Porosity” from the AnalysisModules.



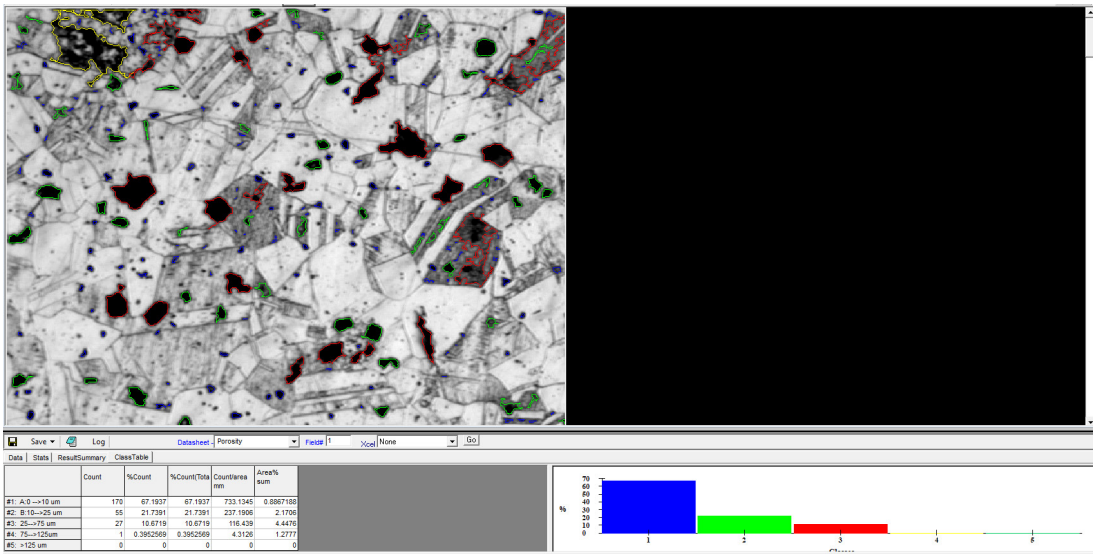
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. In “Configure” select the standard to be used for the analysis from the drop-down list.



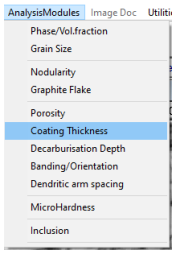
6. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.
7. Analysis will be automatically performed (using the selected pre-processing macro already stored in the software) and the result will be displayed at the bottom of the screen.



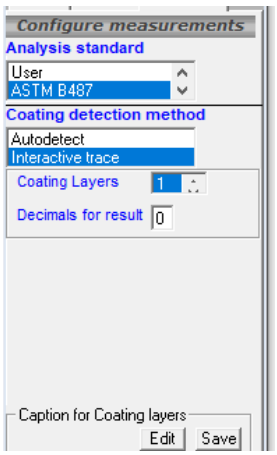
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined pores image and result sheet.

5.6 Coating Thickness

1. Select “Coating Thickness” from the AnalysisModules.



2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:

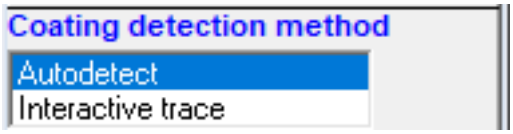


There are 2 different modes to analyze Coating thickness

- Autodetect
- Interactive trace

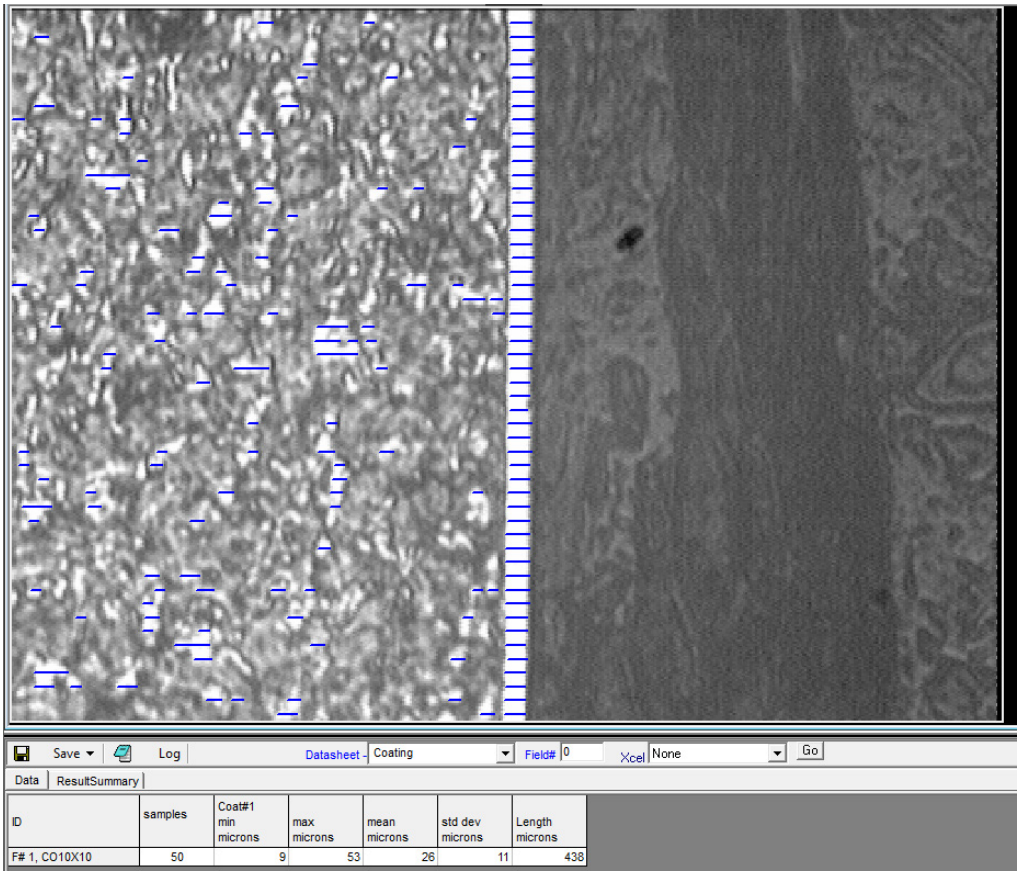
Mode n° 1: Autodetect

1. In “Configure” select “Autodetect” from the drop-down list in the field “Coating detection method” .



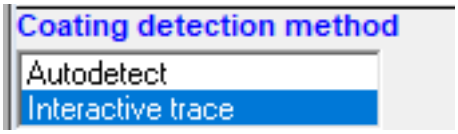
2. Select the number of layers to be counted

3. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.
4. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



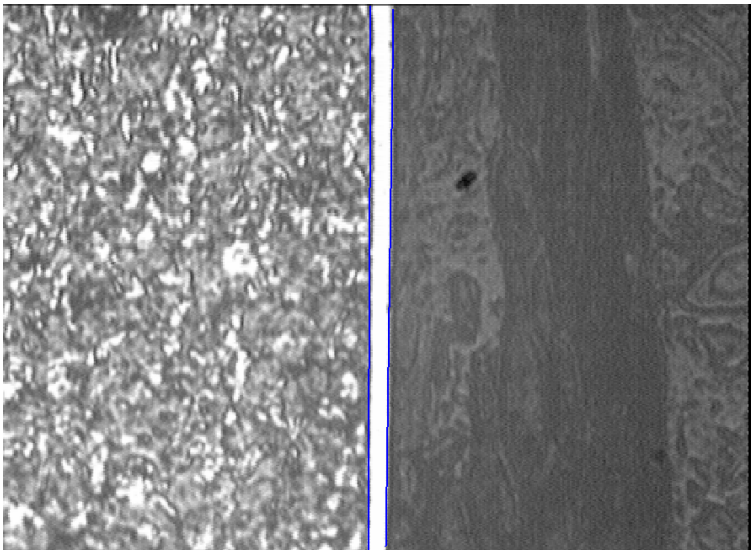
Mode n° 2: Interactive trace

1. In “Configure” select “Interactive trace” from the drop-down list in the field “Coating detection method” .

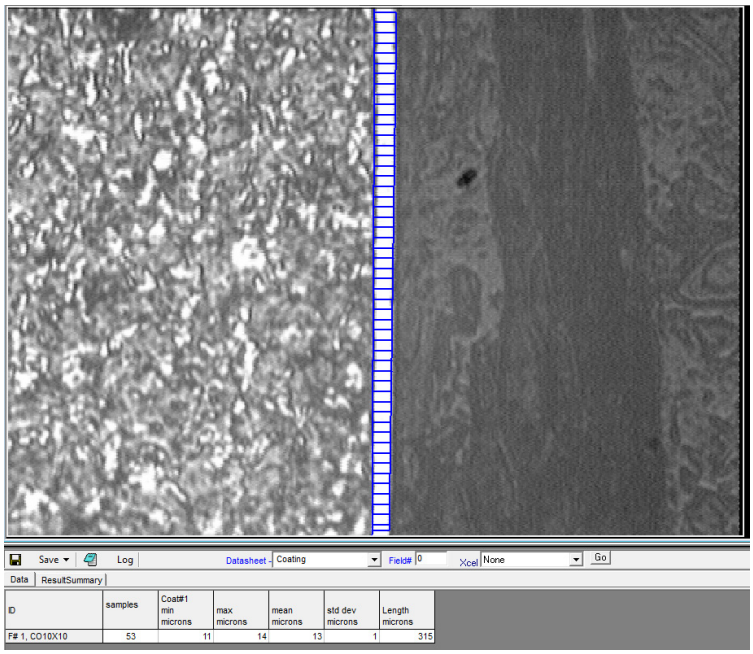


2. Select the number of layers to be counted

3. In “Detect” select the button “Trace edges” to trace both edges of the coating.



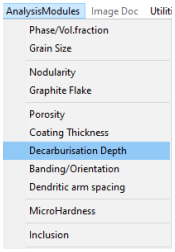
4. Click on “Analyze”.
5. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



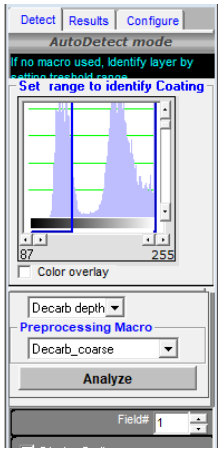
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined coating image and result sheet.

5.7 Decarburisation Depth

1. Select “Decarburisation Depth” from the AnalysisModules.



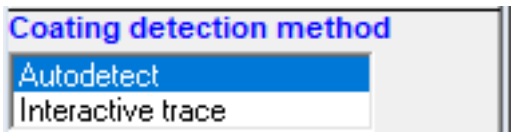
2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



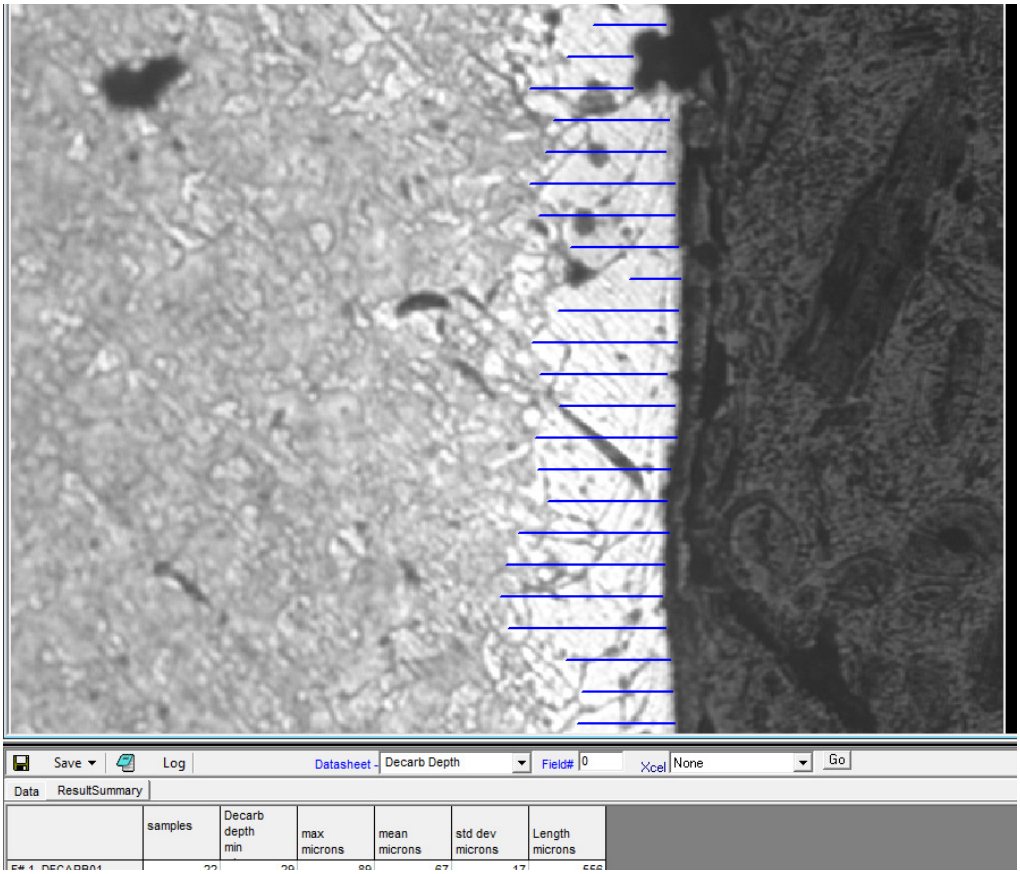
There are 2 different modes to analyze Decarburisation Depth
- Autodetect
- Interactive trace

Mode n° 1: Autodetect

1. In “Configure” select “Autodetect” from the drop-down list in the field “Coating detection method” .

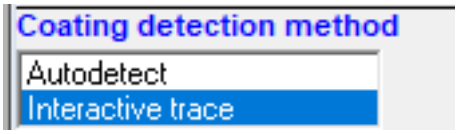


2. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.
3. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



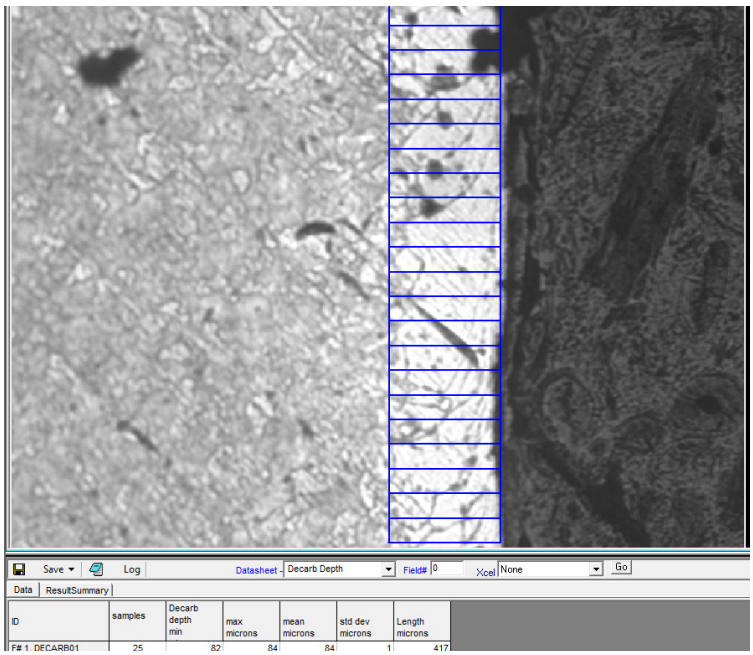
Mode n° 2: Interactive trace

1. In “Configure” select “Interactive trace” from the drop-down list in the field “Coating detection method” .



2. In “Detect” select the button “Trace edges” to trace both edges of the coating.

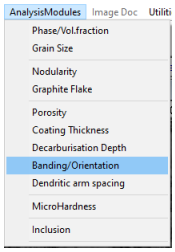
3. Click on “Analyze”.
4. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.



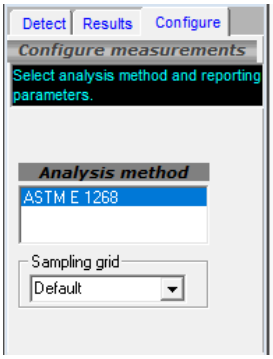
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined decarburised image and result sheet.

5.8 Banding

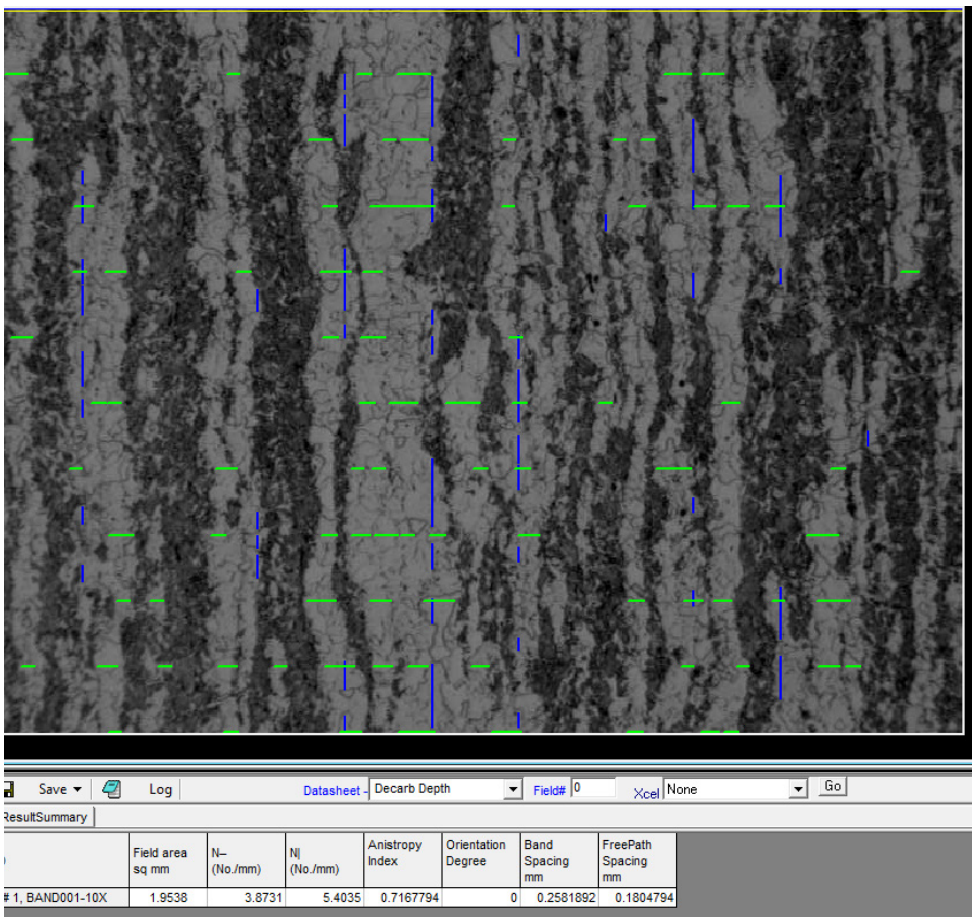
1. Select “Banding” from the AnalysisModules.



2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. In “Detect” select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.
6. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.

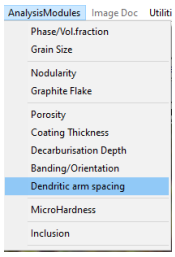


- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined banding image and result sheet.

5.9 Dendritic Arm Spacing

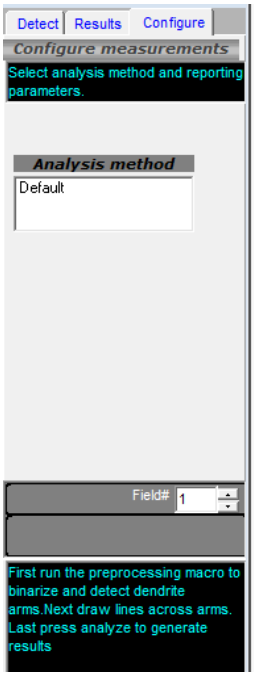
Means calculation the distance between the dendrite’s secondary arms.

1. Select “Dendritic Arm Spacing” from the AnalysisModules.

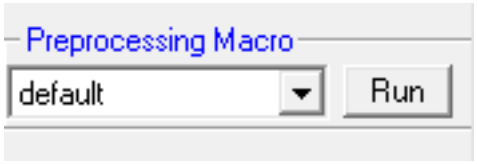


2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.

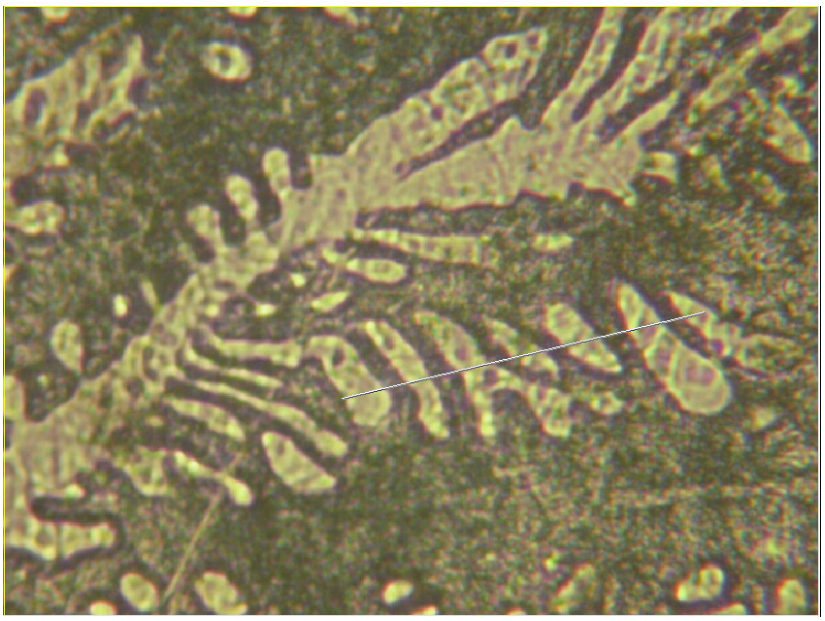
4. The analysis menu on the right side of the screen appears like this:



5. In “Detect” select the “Default” Preprocessing Macro from the drop-down list and then click on “Run” to binarize the dendritic arms.

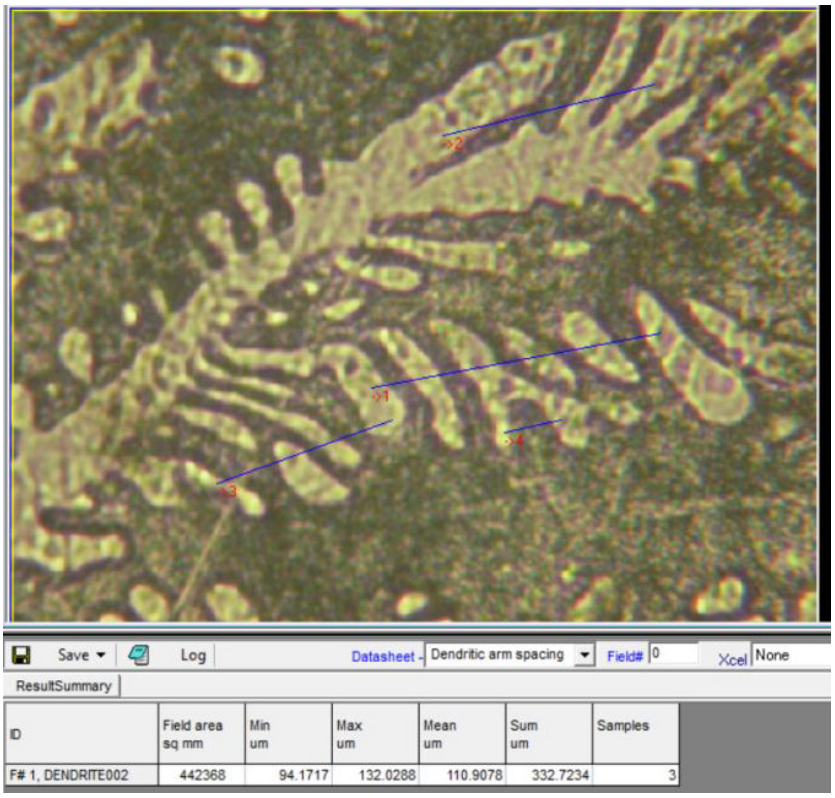


6. Now Click on “Draw lines” to draw lines across the dendrite’s arms.



7. After arms of dendrites are selected click on “Analyze”.

8. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.

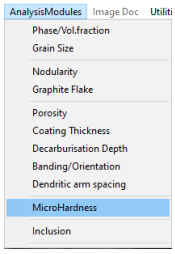


- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of outlined dendritic arm spacing image and result sheet.

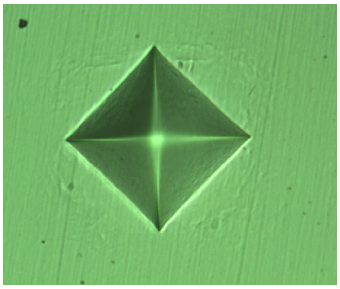
5.10 Micro Hardness

Micro hardness testing is a method of determining a materials hardness or resistance to penetration when test samples are very small or thin, or when small region in a composite sample or plating are to be measured.

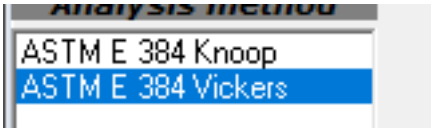
1. Select “Micro Hardness” from the AnalysisModules.



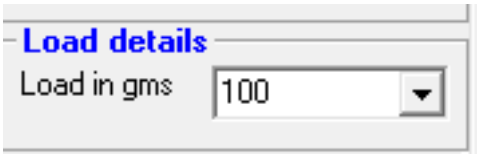
2. Load or snap the image you want to analyze.



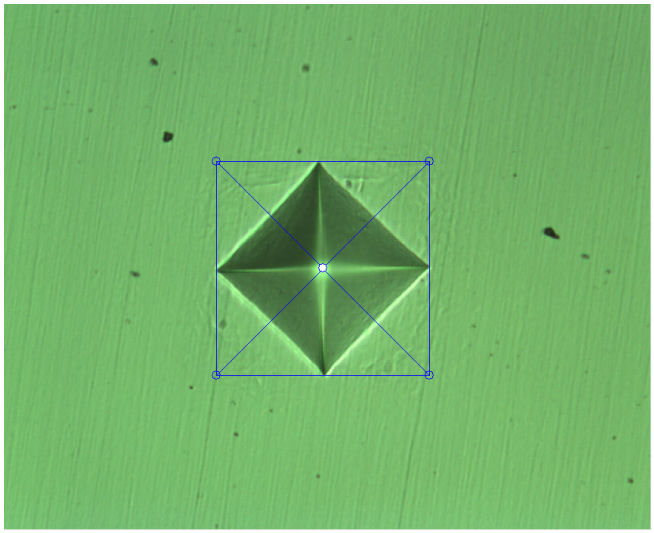
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. In “Configure” select the type of hardness measurement (Vickers or Knoop).



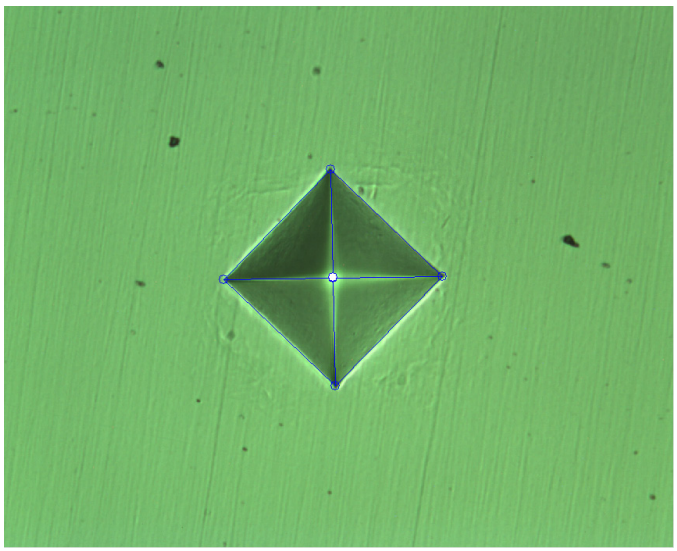
5. In “Detect” enter the load in the field “Load details”.



6. Insert the distance from surface (if known), then click on “Accept”.
7. Click on “Draw Diamond” to draw a diamond on the image.

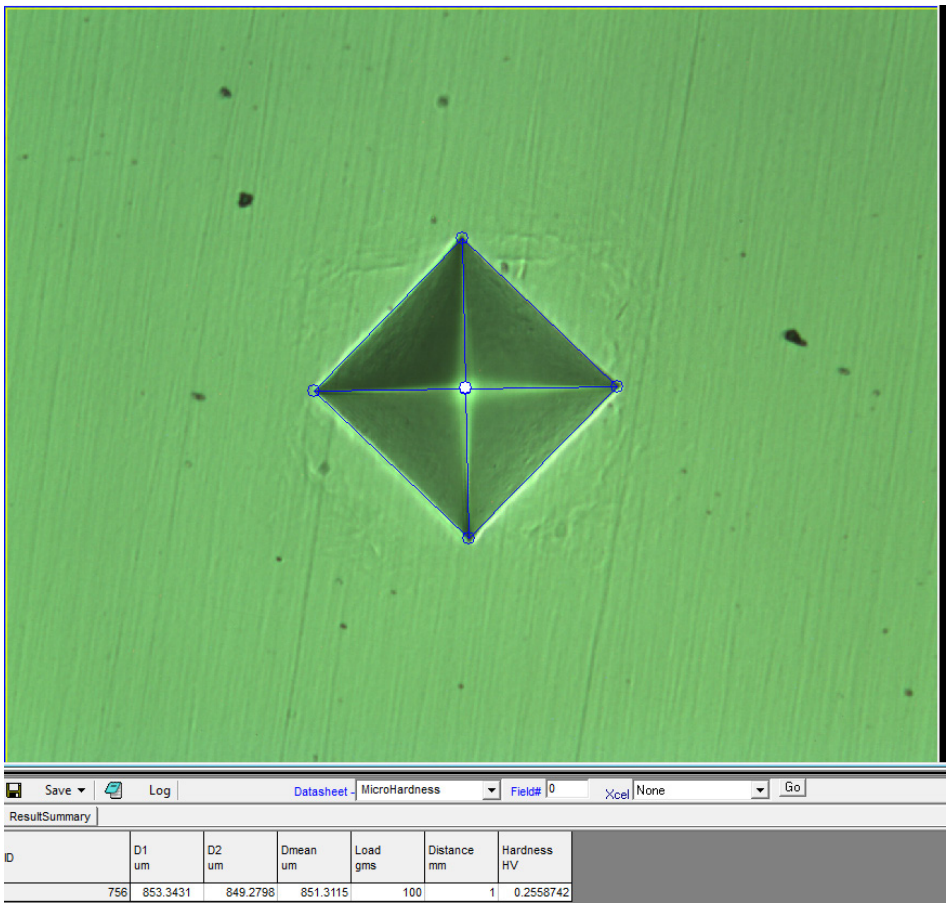


8. Adjust flairs with the mouse by left or right click to corners of the diamond dragging to edges of indent and then click on “Measure”.



9. Measurement will be performed and the result will be displayed at the bottom of the screen.

10. Analysis will be automatically performed and the result will be displayed at the bottom of the screen.

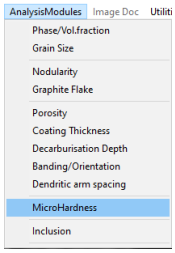


ID	D1 um	D2 um	Dmean um	Load gms	Distance mm	Hardness HV
756	853.3431	849.2798	851.3115	100	1	0.2558742

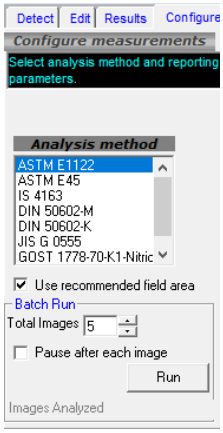
- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of microhardness image and result sheet.

5.11 Inclusions

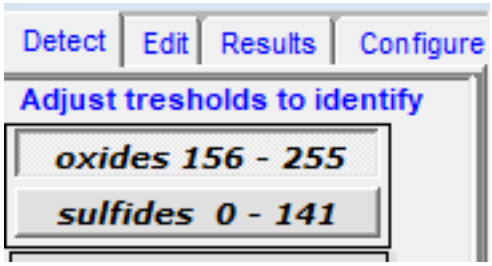
1. Select “Inclusion” from the AnalysisModules.



2. Load or snap the image you want to analyze.
3. Select the proper calibration from the calibration drop-down list and click on “Attach”.
4. The analysis menu on the right side of the screen appears like this:



5. In “Detect” select whether you want to count “Oxides” or “Sulfides”.



6. Select the most suitable Preprocessing Macro from the drop-down list and then click on “Analyze”.
7. Analysis will be automatically performed (using the selected pre-processing macros already stored in the software) and the result will be displayed at the bottom of the screen.

- To get the results in PDF format click on “Result Summary”. A PDF with the selected template will appear containing original image, overlay of inclusions image and result sheet.

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