

Membrane-Based Counting of Particulate

Image Analysis Report 450

Sample Description

A circular membrane, fixed on a slide, is submitted for analysis.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can automatically discriminate and measure the particulates deposited on the membrane.

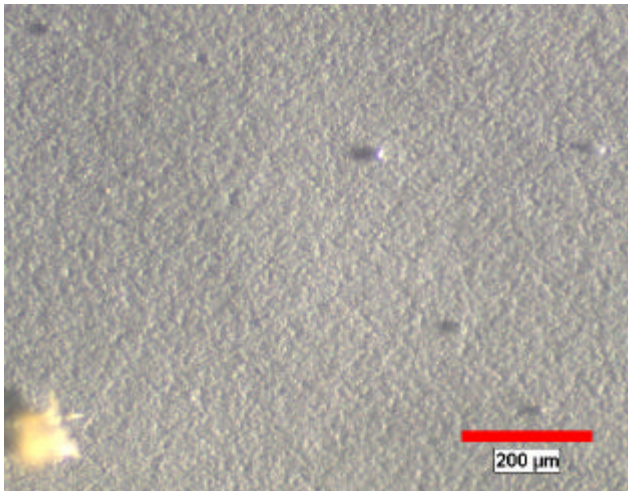


Figure 1: Original image at 100 x (1.27 microns/pixels).

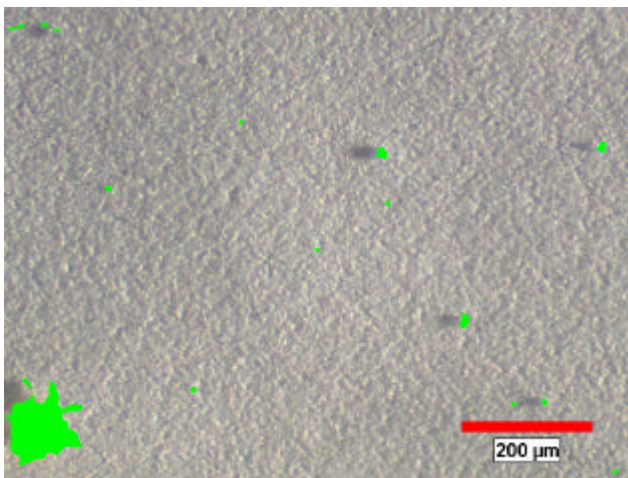


Figure 2: Outline view of final detected particulates as measured.

Procedure

Detecting all types of particulates on the membrane necessitates several binarization steps. Dark, white, yellow and red or any other possible color has to be detected. Gray filters are also applied to allow binarization of more difficult objects. All binarized features are cleaned from artifacts then grouped together. Finally, particulates that are smaller than 25 microns are eliminated from the bitplane to be measured (Green).

Results

Length measurement is performed on the particulates greater than 25 microns only. A Guard Frame is used to avoid measuring only a part of those features that are sectioned by the field of view. Results were cumulated for automated statistics and graph generation. Final results can be printed directly from Clemex Vision. Raw data are linked to their respective object and can be exported in Excel format.

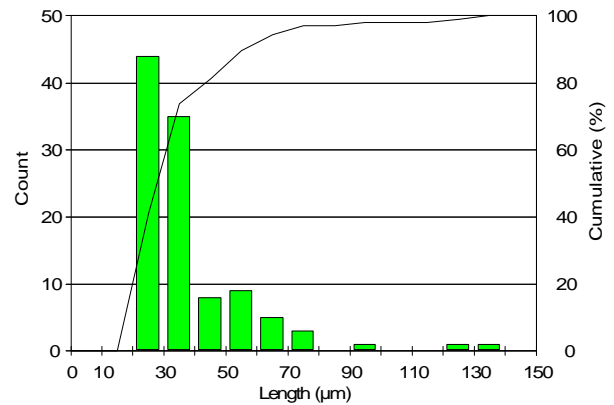


Figure 3: Length distribution of particulates greater than 25 microns.

Equipment

Image Analysis

System:	Clemex Vision PE
Camera:	Sony DXC-950P
Microscope:	Nikon Optiphot - 2
Illumination Type:	Reflected light + Oblique light (10°)
Magnification:	100 X
Motorized Stage:	Motorized Marzhauser 40x40 mm
Stage Controller:	Clemex ST-2000

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Discussion

This analysis is complex since the oblique illumination creates shadows. However, in some cases, the shadow also helps the reconstruction of features. Since the particulates could be of any color, any intensity (black to white) and any shape, it considerably increases the difficulty of the analysis.

The area to cover is circular meaning that a part of the fields showing the outer edge of the sample should not be considered in the analysis. The particulates detected in these sections could be automatically eliminated. To do so, a point would have to be drawn in the center of the membrane and the master origin of the pattern would have to be set on this point. Any feature at a distance greater than the radius value could be eliminated. If we are not allowed to draw a dot on the membrane then features can be removed from the analysis using the mapping view mode.

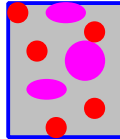
Once in a while, one of the lightest particulates may be under detected and conversely some particulates could also be over detected. But this it is rare. It is of good practice to validate the results using the mapping view mode.

Globally, it is almost incredible to see how well this analysis can operate considering all the difficulties it deals with.

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IMAGE ANALYSIS REPORT

Images



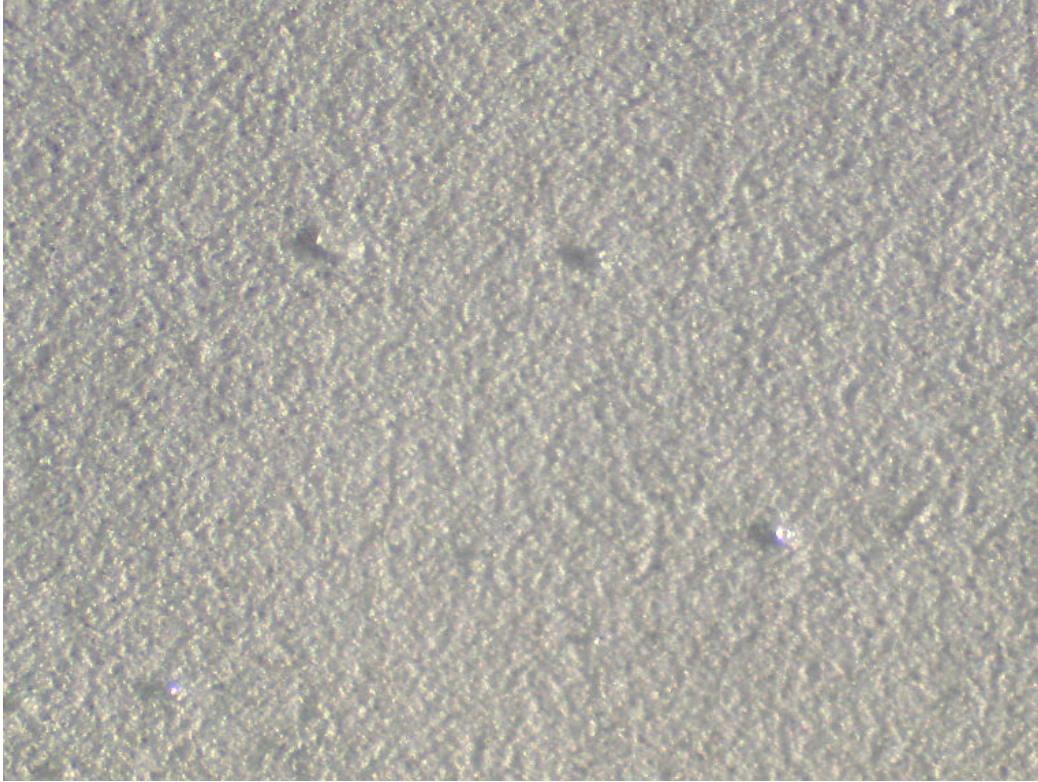


Figure 1: Original image at 100x.

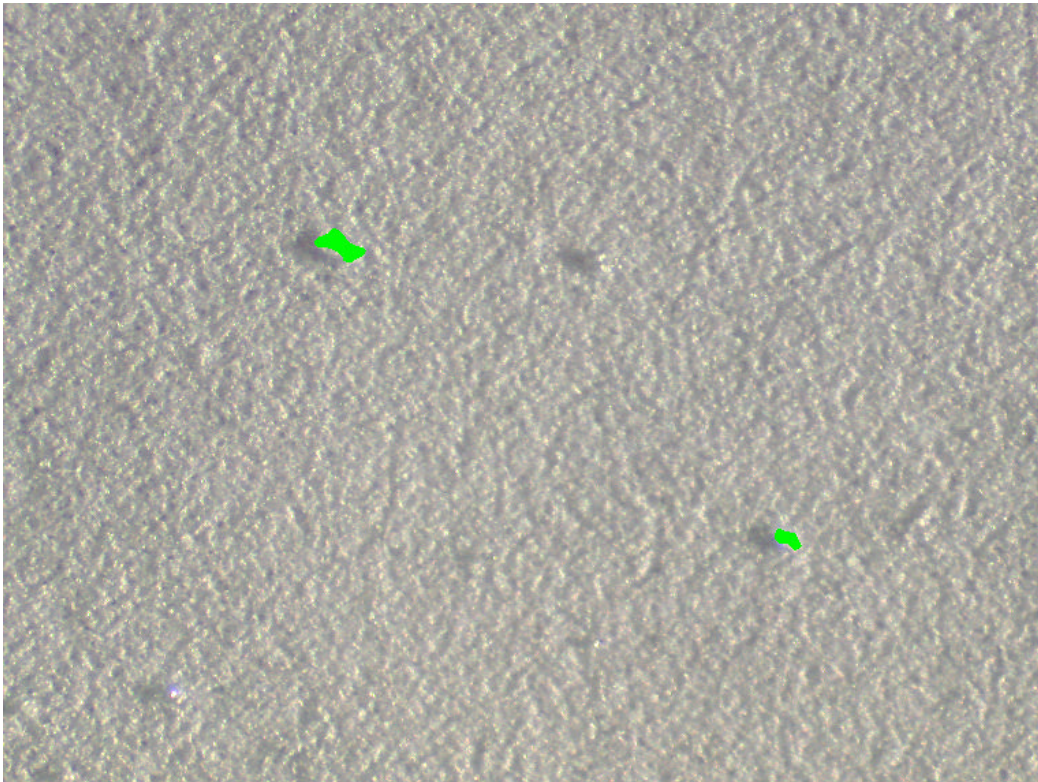


Figure 2: Detected features (> 25 microns).



Figure 3: Original image at 100x.

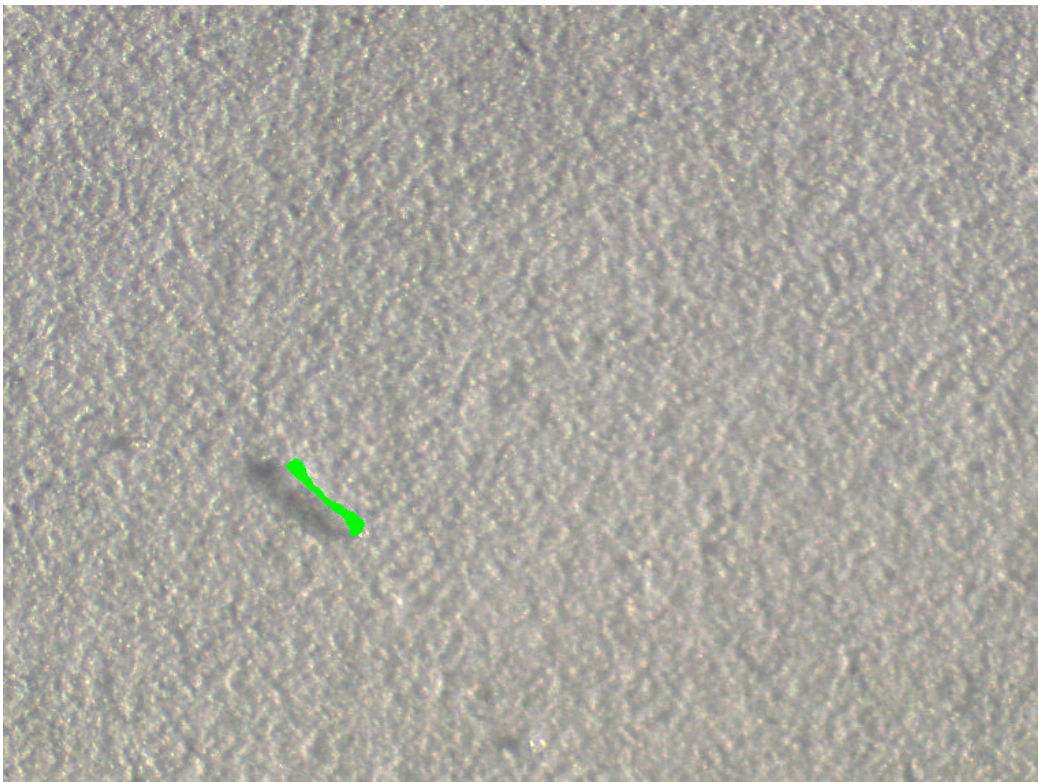


Figure 4: Detected feature (> 25 microns).



Figure 5: Original image at 100x.

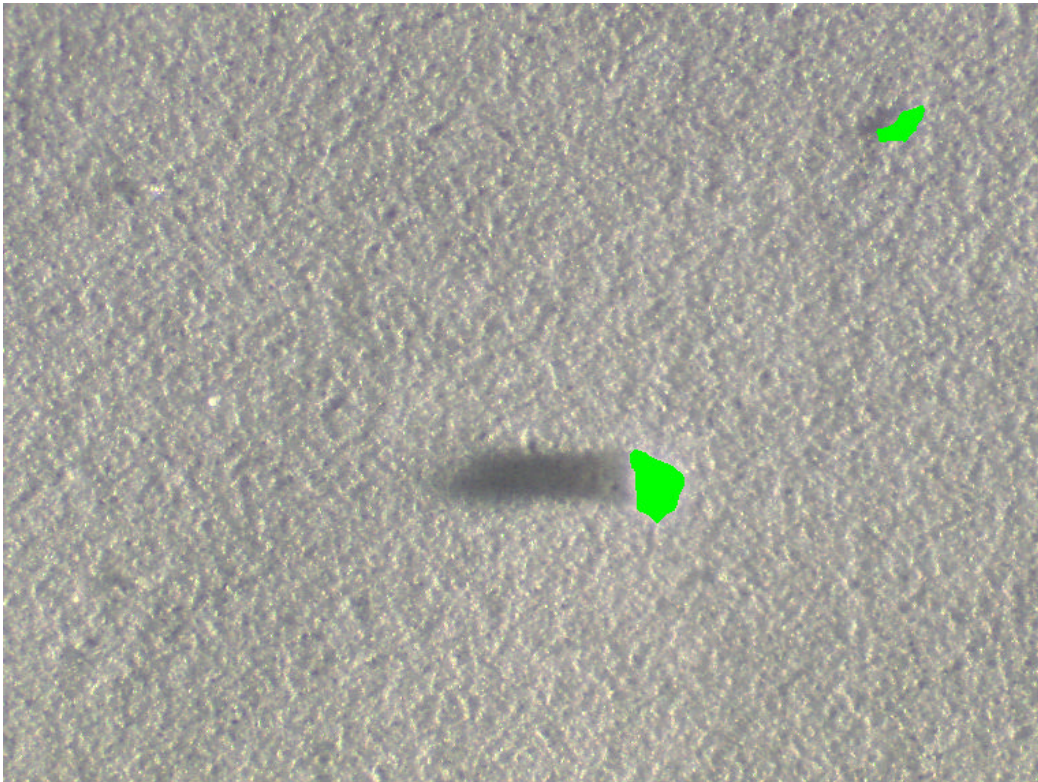


Figure 6: Detected features over 25 microns.

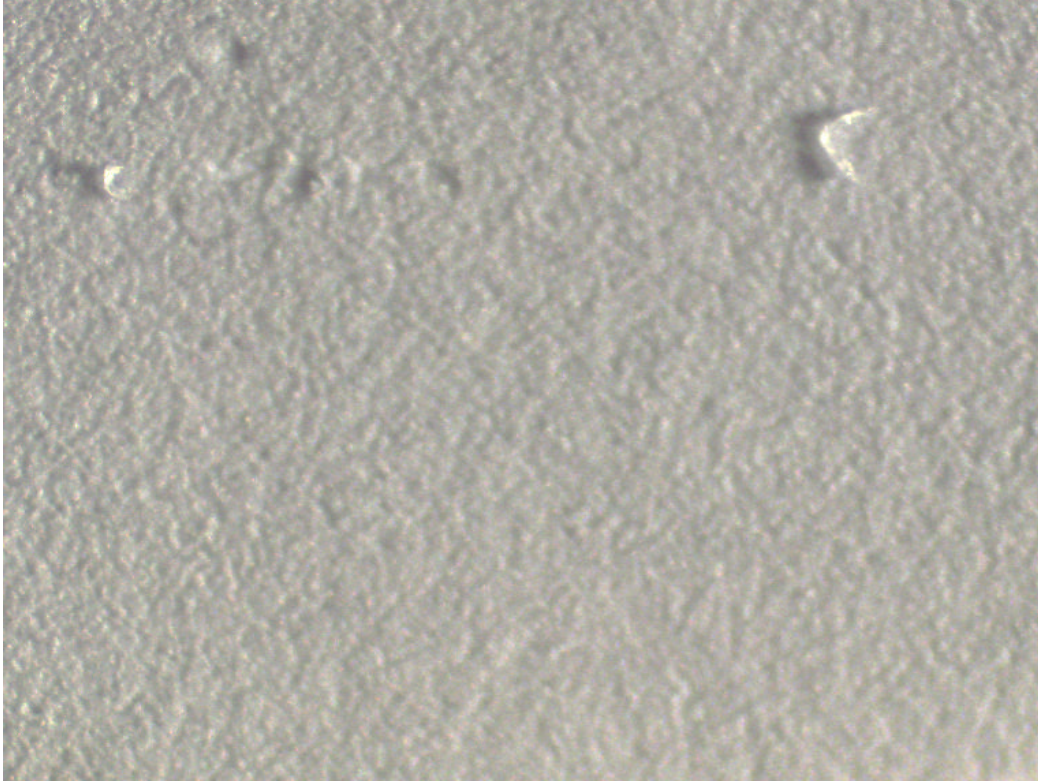


Figure 7: Original image at 100x.

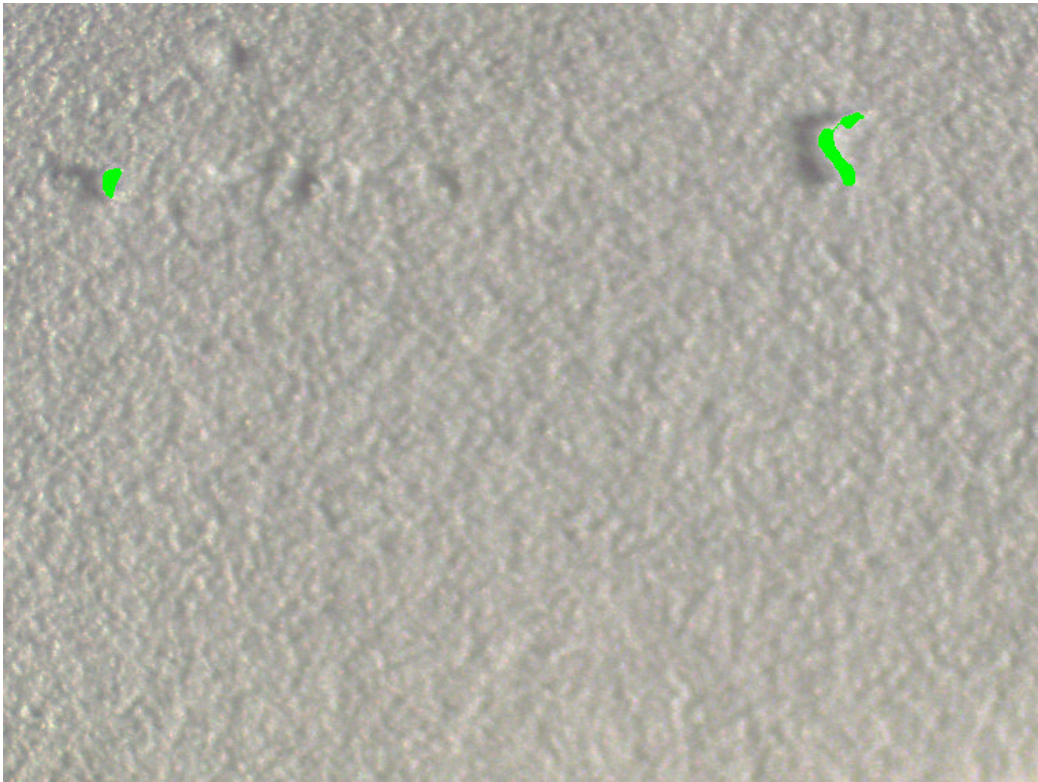


Figure 8: Detected features (> 25 microns).

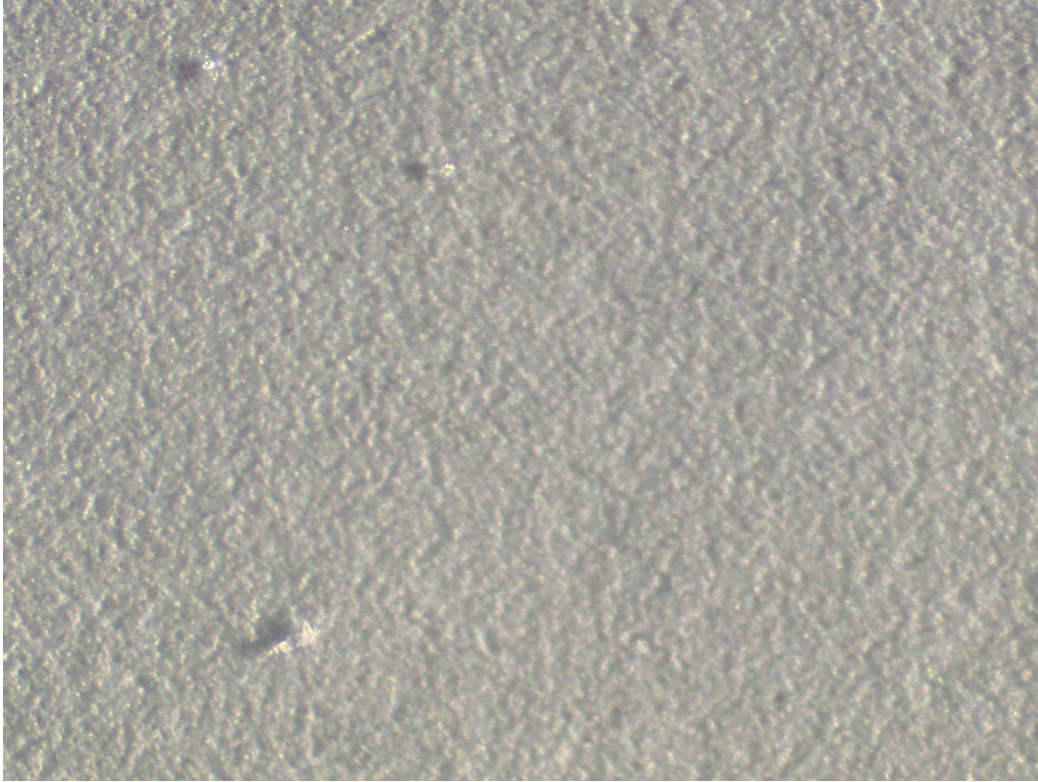


Figure 9: Original image.

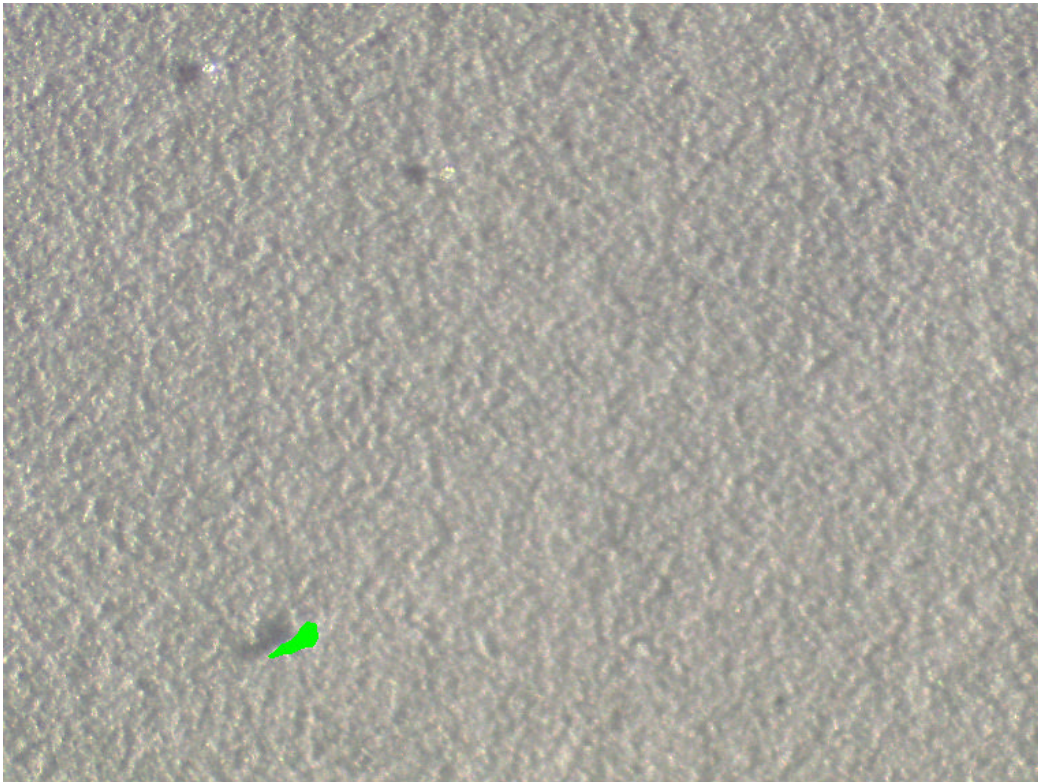


Figure 10: Detected feature.

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