CLEMEX

Grain Sizing in Anodized Aluminum

Image Analysis Report **357**

Sample Description

Mount containing five samples of anodized aluminum.

Purpose of Analysis

Demonstrate the ability of the Clemex Vision image analyzer to measure the grain size using ASTM E112 standard and average size in microns.

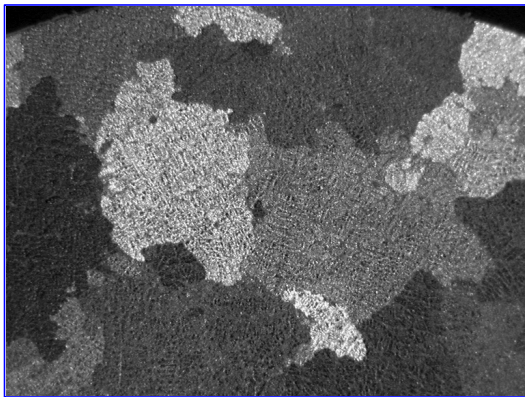


Figure 1: *Typical field of view in polarized light (25x). Calibration factor = 4.9587 mic./pixel.*

Procedure

Some gray filters were applied on the original image to spread the gray levels uniformly. An auto Gray Threshold roughly binarized grains into different colors. Binary tools were used to remove artifacts and to group all grains into a unique bitplane while keeping them seperated. A Separate instruction is applied on very large grains sectioning them according to their concavities.

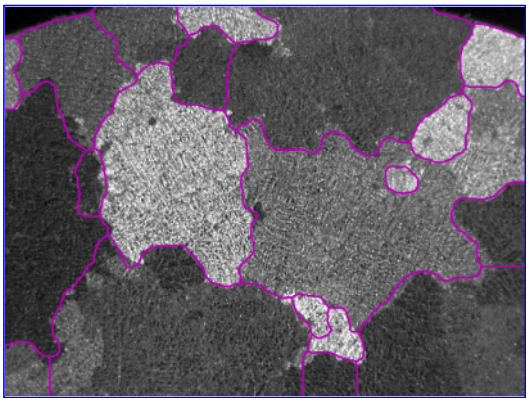
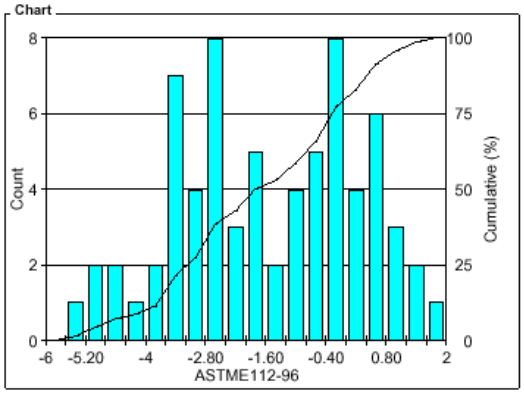


Figure 2**:** *Grain network overlaid against the original image.*

Results Summary

The requested ASTM E 112 measurements are performed and cumulated for automated statistics and graph generation. Final results are printed directly from Clemex Vision.



Statistics		
Minimum:	-5.38	
Maximum:	1.75	
Count:	70	
Rating #:	-2.08	
Under:	0	
Over:	0	
Accepted:	100	%
Field Count:	5	
Field Area:	10710776.99	µm²
Total Area:	53553884.95	µm²

Figure 3: *Grain size distribution and statistics.*

To obtain reliable results using image analysis, the grains must be sufficiently distinguishable by the eye. Consequently, the microscope and the camera settings have to be optimized. Some boundaries might be omitted during detection and some grains might be mistakenly sectioned. A boundary might also be slightly misaligned. As long as there is a balance between these, they have no significant influence on the final results compared to the one obtained on a manually drawn grain network.

Equipment

Image Analysis System:	Clemex Vision PE
Camera:	Sony 950 P
Microscope:	Nikon Optiphot 100
Objective:	Nikon 2.5 (Mag.: 25x)
Motorized Stage:	Marzhauser 100 mm x 75 mm