

ASTM E1268 Banding Analysis

Image Analysis Report # 304
Clemex Technologies

Sample Description

One steel sample showing banding dual phase structure was submitted for analysis.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish and measure both phases and evaluate their banding accordingly to ASTM E1268 standard.

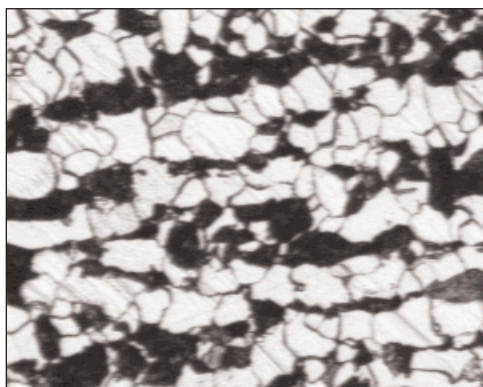


Figure 1: Part of the original image (200x, 0.8371 microns/pixel).

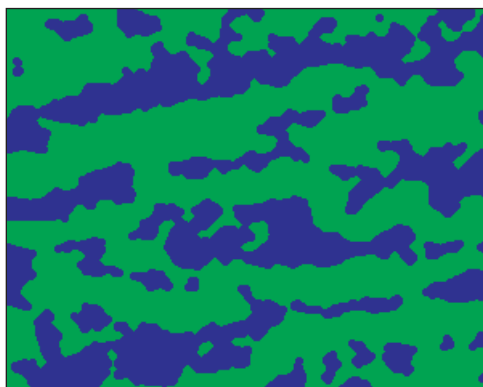


Figure 2: Outline of fibers as measured in blue bitplane.

Procedure

The phase to evaluate (dark) is binarized in blue using Gray Thresholding. Adjustable binary manipulations are made to join connect neighboring objects.

Artifacts are eliminated prior to measurements.

Results

Area Percentage is performed on both phases and Anisotropy,

NLparallel, NLperpendicular, PLparallel, PLperpendicular, Anisotropy Index, Degree of Orientation, Mean Spacing, and Mean Free Path Perpendicular measurements are performed on the phase of interest (Blue bitplane). Automated statistics and graph are generated and cumulated during the analysis of the same. Final results can be printed directly from Clemex Vision. Raw data can be exported in Excel format.

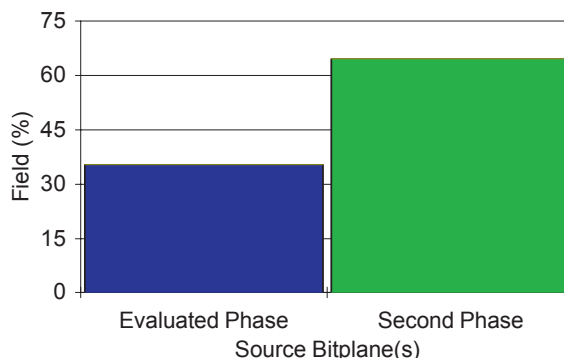


Figure 3: Area percentage of both phases.

Results of the measurements included in the analysis:

Area % of Evaluated Phase (Blue):	35.41%
Area % of Second Phase (Green):	64.59%
Anisotropy:	0.74
NLparallel:	0.0219 (1/μm)
NLperpendicular:	0.0295 (1/μm)
PLparallel:	0.0438 (1/μm)
PLperpendicular:	0.0590 (1/μm)
Anisotropy Index:	1.35
Degree of Orientation:	0.18
Mean Spacing:	33.9134 (μm)
Mean Free Path Perpend.:	21.90 microns

Equipment

Image Analysis System:	Clemex Vision PE
Microscope:	Leica DM LM
Objective/Magnification:	20x / 200x
Illumination:	Reflected Light
Calibration:	0.8371 microns/pixel
Camera:	Sony DXC 950P
Motorized Stage:	Marzhauser EK32IM 75x50mm
Stage Controller:	Clemex ST-2000

Discussion

The main difficulty of this analysis was to create custom measurements needed to satisfy the ASTM E1268 standard. Once these custom measurements were created, the analysis was very simple.

Results are reproducible.