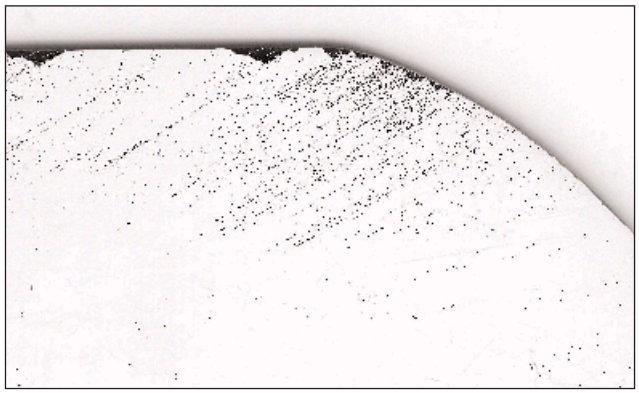
CLEMEX

Image Analysis Report

672

Crystal Defect Analysis in Wafer



Clemex Technologies Inc.

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Crystal Defect Analysis in Wafers

Image Analysis Report # 672

Sample Description

One jpeg image of etched wafer showing crystal defects (etch pits) was submitted for analysis.

Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish the pits. The location of the 1 cm x 1 cm square which contains the most etch pits and the quantity of pits in that square are both requested. The top n locations where n currently = 1 or 3 have to be identified. Square must not overlap. An image showing the detected pits and the top n locations have to be saved and must appear in the final report.

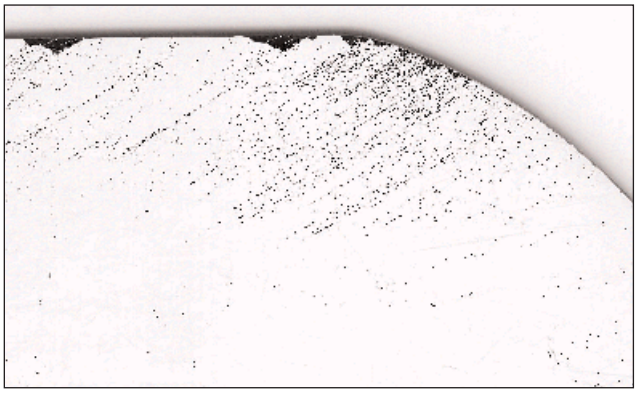


Figure 1: *Part of the N1050809 213 image (42.77 microns/pixel).*

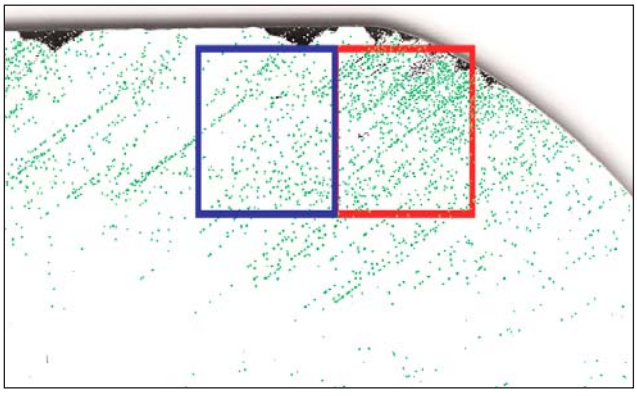


Figure 2: *Etch pits are shown in green. Worst field of 1 cm x 1 cm appears in red.*

Procedure

The image was calibrated based on the wafer size. Etch pits were binarized by Gray Thresholding. Some artifacts were eliminated. Then, the system stops allowing the user to pinpoint a region that could be the worst one. Ten regions could be identified by the user.

Results

Each identified square is measured for etch pit count and area. Their respective position (X1, Y1 and X2, Y2) are also measured. Each corresponding result appears in the Data Browser sorted from highest count to lowest one. The user keeps the 3 (or the unique) fields having the highest quantity of etch pits and that do not overlap. When you press continue, the final report is automatically generated.

				Coo
	Square	**Pit Count**	**Pit Area (mm2)**	**X1**
Worst 1:	RED	655	13.47	63.64
Worst 2:	PINK	433	5.96	66.38
Worst 3:	BLUE	395	6.20	53.55

Figure 3: *Part of the table showing etch pit count and area for each square and their respective coordinates.*

Equipment

Image Analysis System:	Clemex Vision PE
Other Modules:	Report Generator
Calibration:	42.77 microns/pixel

Discussion

The present analysis was performed on a scanned image. It would also be possible to create a mosaic allowing more resolution in the final image. The resolution may have an impact on the way defects are reconnected or not, so counted as one or several features.

The approach used to identify the worst field is semi automatic. This method allows precise positioning of the 1 cm x 1 cm grids over the representation of the wafer. Automatic analysis could have been done but to cover a minimum of possibilities, 4 grids interposed of 0.5 cm would have to be overlapped. The 0.5 cm of increment could not be sufficient to center the worst fields and all these overlapping grids are very confusing to interpret.

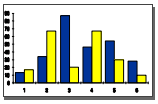
The semi automatic method allows precision in the selection of the area of interest and also permits an easy final identification of the worst *n* squares. Since up to 10 squares can be identified, the user can overlap two or three of them in case of hesitation between the worst area. At final step, when their corresponding quantity of pit appears, only the worst of the two (or three) overlapping squares is kept.

Adding to etch pit count, each square position is memorized and a picture showing all pits and squares is saved and added to the final report.

CLEMEX

Image Analysis Report

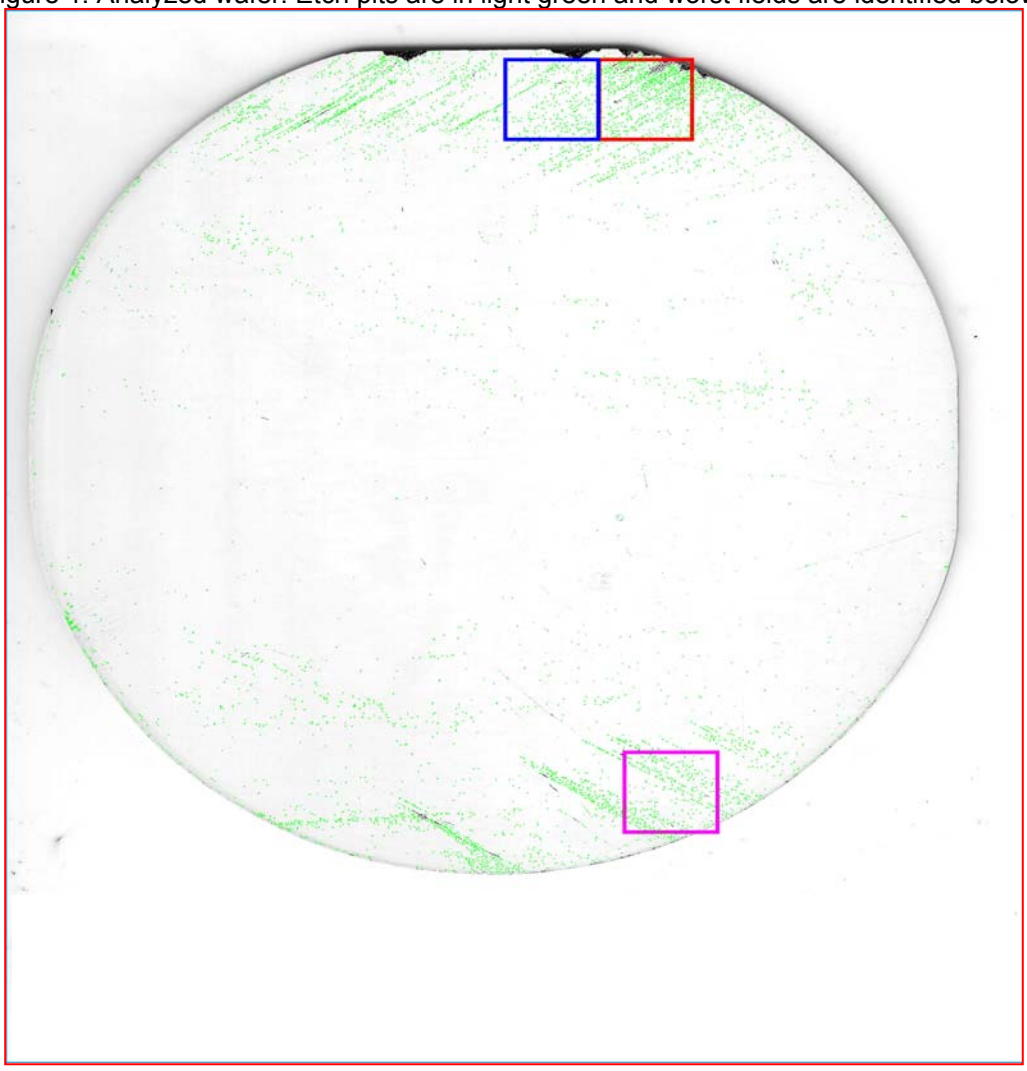
Report



Etch Pit Analysis in Wafer

Compagny:	Clemex Technologies	**Magnification:**	Scan
Date:	2006 05 05	**Calibration:**	42.7716 µm/pixel
User:	Myriam Savard	**# Fields:**	1
Sample ID:	A1	**Units:**	mm

Figure 1: Analyzed wafer. Etch pits are in light green and worst fields are identified below.



100 mm wafer

				Coordinates of each square in mm			
	Square	**Pit Count**	**Pit Area (mm2)**	**X1**	**Y1**	**X2**	**Y2**
Worst 1:	RED	655	13.47	63.64	-5.69	74.04	-15.61
Worst 2:	PINK	433	5.96	66.38	-88.45	76.78	-98.37
Worst 3:	BLUE	395	6.20	53.55	-5.69	63.94	-15.61