

## Particle Sizing of Ceramic Powder

Image Analysis Report 468

### Sample Description

One tiff image of ceramic powder was submitted for analysis.

### Purpose of Analysis

Demonstrate that the Clemex Vision image analysis system can distinguish the particles and measure them to calculate their volume. Express the results using percentiles (10, 50, 90 and 100).

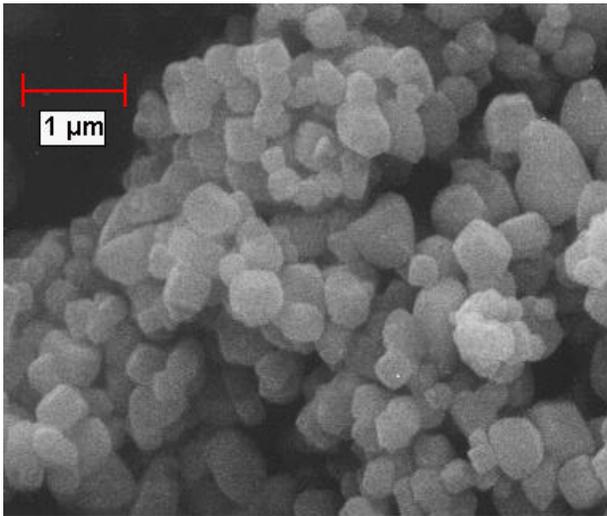


Figure 1: Part of original image at 10 000x (0.016 micron/pixel).

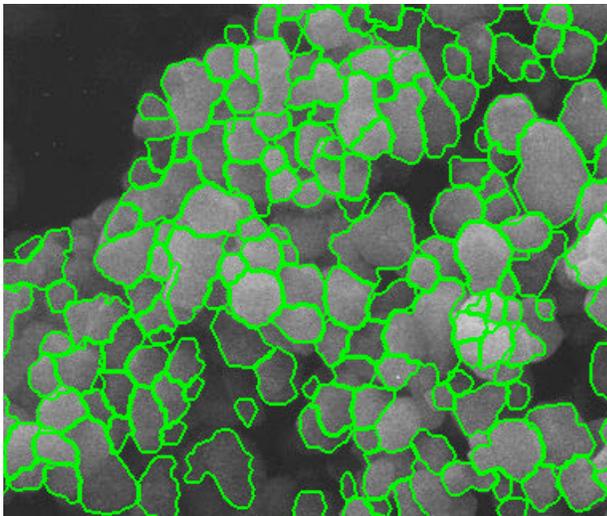


Figure 2: Particles as measured in green bitplane after automatic separation.

### Procedure

Some gray filters are applied to outline particle boundaries. The result is binarized in red and combined with a second binarization (green) performed on the original image. The outlines bitplane (red) is removed from the particles bitplane (green) to obtain partially separated particles.

Automatic separation is applied using a special binary tool. Artifacts, sectioned particles, rough features and very elongated ones are eliminated prior to measurements.

### Results

Area, Length, Circular Diameter, Area of Complete Circle, and Maximum Volume measurements are performed on each particle. Automated statistics and graph are generated and would be cumulated on complete analysis (over a sample). Final results can be printed directly from Clemex Vision. Raw data are linked to their respective objects for validation. Raw data are also exported in Excel format to calculate the 10, 50, 90 and 100 percentiles.

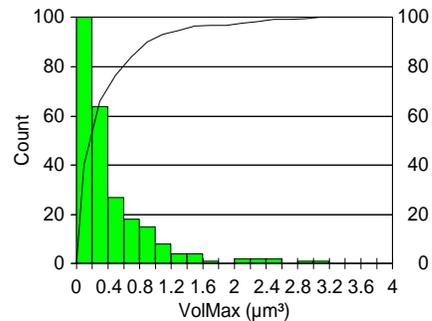


Figure 3: Calculated volume distribution of particles.

|                              |       |       |       |       |
|------------------------------|-------|-------|-------|-------|
| Percentiles:                 | 10    | 50    | 90    | 100   |
| Volume (mic. <sup>3</sup> ): | 0.061 | 0.247 | 0.982 | 3.160 |

### Equipment

|                        |                        |
|------------------------|------------------------|
| Image Analysis System: | Clemex Vision PE       |
| Magnification:         | 10 000x                |
| Calibration:           | 0.016129 microns/pixel |

### Discussion

The main difficulty of this analysis is to binarize the particles. The problem was easily overcome using gray filters.

The automatic separation doesn't separate all connected features. Also, some features are sometimes over separated so both effects tend to counteract. It's a good habit to validate the results with the mapping view tool.

The volume was calculated using the maximum size (length) of particles.

Results are reproducible.