Zeematu NanoParticle Analysis Software

Atomic force microscopy is a powerful technique for:

* counting the number of nanoparticles on a surface

* measuring the critical dimensions of nanoparticles.

Zeematu software is designed specifically for analysis of AFM nanoparticle images. Analysis of a nanoparticle image takes only minutes and provides all the critical parameters of the nanoparticles in an image, including their size. With a unique thresholding algorithm, particles are rapidly identified. The nanoparticles can then be counted and their critical dimensions can be calculated.
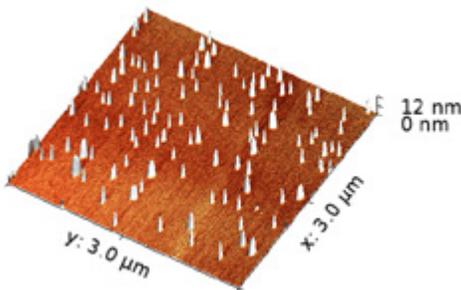
▶ **Analysis Window**

Once an image is loaded into the Zeematu software, the background can be removed with leveling software. Several leveling functions are available, including 3-point plane, horizontal, and vertical plane subtract. Once the background is removed from the image, the following screen is used for identifying and counting the particles.
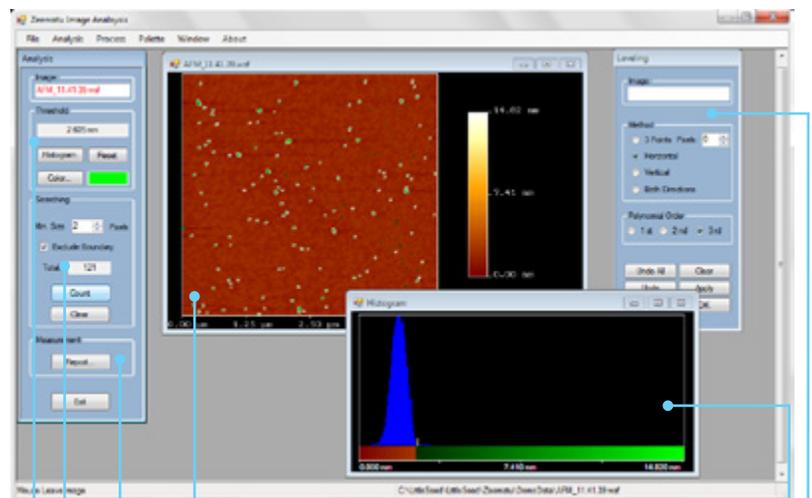
Image of nanoparticles, green indicates the nanoparticles identified with the software's algorithm

Acivates algorithm for identifying particles

User interface for counting particles in an image.

Creates report of particle sizes.

Window with options for removing an image's background.

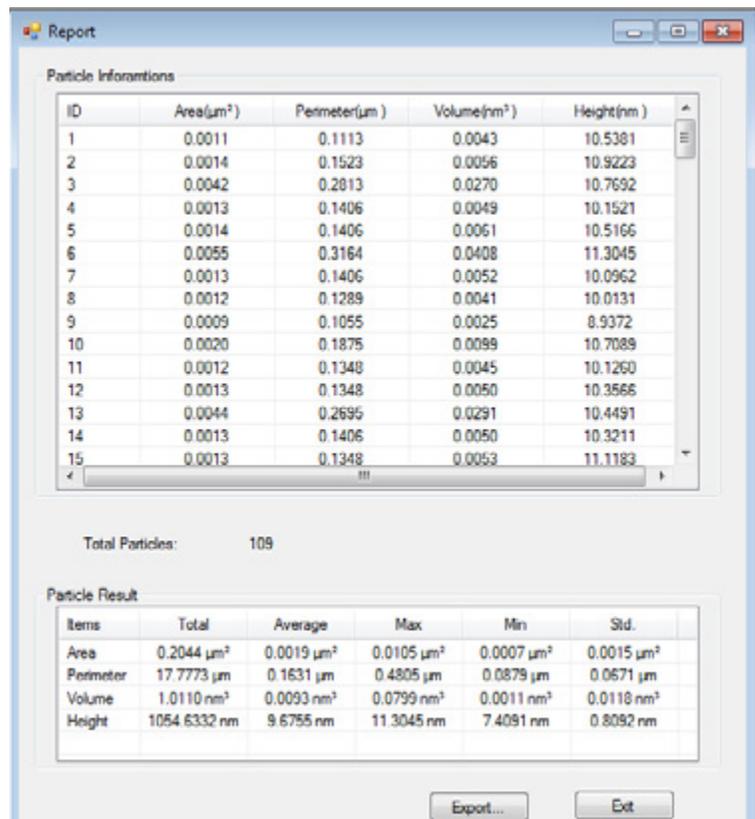Histogram is used for setting the limit of height that designates a particle in the image

Thresholding is the most common method for identifying particles in an image. In this method, a histogram plot is used for setting a height in the image. Everything above the selected height is considered a particle and is colored green. This process may be repeated several times until all particles in the image are colored green. Once identified, the critical dimensions of the particles may be calculated.

It should be noted that the area, perimeter and volumes measured with an AFM are a convolution of the probe shape and the nanoparticle shape. The height that is calculated is an accurate measure of the particle's shape, as it does not depend on the geometry of the probe.

Exported data can be utilized to create histogram plots illustrating particle size versus the number of particles. The **histogram plot** on the lower right was made by importing a text file into Open Office Calc program. Other data/spreadsheet programs will provide a similar plot.

► **Report Window**

After the program's search algorithm has identified the nanoparticles in an image, the critical dimensions for each of the nanoparticles may be calculated. Critical dimensions include: area, perimeter, volume and height. The value for each particle is displayed as well as the average, high, low and deviation values. The values may then be exported to an .xls or .txt file.

► **Histogram Plot**