ABSTRACT OF THE DISCLOSURE

SELECTIVE DEPOSITION OF A PARTICLE BEAM BASED ON CHARGING CHARACTERISTICS OF A SAMPLE

A method of preparation of a map of areas on a sample that collects charge, and a method for using the map to selectively scan and modulate the intensity of the electron beam of a SEM so as to discriminate between the charging and non-charging areas of the sample. To generate the charging map, an image is first checked for saturation. The frame for the image is acquired by using digital scan control coupled with digital acquisition of the secondary electron detector signal. The next step is to perform a "fast scan" where the first frame is taken at the maximum frame rate that the system is capable of. A fast scan does not allow time for significant charge to collect on surfaces, and this provides a base level to subtract from a slower scan that allows charge to accumulate. Areas where the difference between the two is larger indicate areas of charge collection. A "slow scan" is then performed. The frames are then subtracted pixel-by-pixel in order to isolate the charging component of the image. After the pixel-by-pixel subtraction, the charging map is created.

To obtain a more ideal charging map, further image processing is performed to reduce the noise level as well as to merge pixels together to form a fuller representation of a charging feature. The selective deposition process for charging reduction is accomplished by modulating the electron beam intensity to adjust the dosage on a sample based on the charging map. The total charge build-up on the charging areas is controlled by depositing the beam on the charging areas only on selected scans. The non-charging areas are preferably exposed to the beam during every scan, which, together with averaging performed using a plurality of scans, maximizes the S/N (signal-to-noise) ratio.

Figure 1 of the Drawing is to accompany the Abstract when published.