BSE Detector Revived Through Plasma Ashing

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As Nano research fields have grown in the past decades and continue growing at a faster pace than ever, the industry is moving toward working with smaller and small specimen. This results in the high requirement of enhanced magnification and clarity in image viewing. Obtaining clear image quality and enhanced magnification is prevented when contamination exists in the chamber [1].

When carbon contamination accumulates in the SEM chamber after many days of imaging by 3View2XP technique image quality begins to deteriorate [1]. Collecting useful data from a sample after a period of time becomes tenuous (figure 1.1). Frequently it is necessary to clean or replace the Back Scatter Electron (BSE) detector.

In this report we describe a process where a BSE detector deemed unusable was revived by a short exposure to a downstream plasma with the ibss Group Inc. GV10x Asher™. Given the high level of success, further studies will be performed to establish proof that the Asher downstream process is repeatable and dependable [1].

The GV10x Asher™ was mounted onto a Zeiss 3View2XP electron microscope. In the first phase of the cleaning protocol, the BSE detector was removed and chamber cleaned for five minutes at three pascal (8 mTorr) pressure and 45 Watts downstream plasma power.

Next, the BSE detector was placed in line of sight of the Asher Source and cleaned for five minutes at three pascal and 45 Watts DS plasma power. With just five minute of cleaning, a clear improvement in performance can observe (figure 1.2)

Third, the BSE detector was cleaned for a second time by placing the Asher Source in line of sight and cleaned for 8 minutes at 3 Pa and 45 Watts DS power. As a result, we can now get higher magnified image and still be able to see clear detail (figure 2.2).

During the study, the sample was always removed and column valve closed during microscope chamber/BSE detector downstream plasma cleaning. All images during were obtained at 10k x 10k raster and 4,000X magnification.

The low pressure downstream plasma produced by the GV10x Asher™ isolates the damaging species in the plasma from the gentle oxidizing species [2].

References:

Figure 1.1 Before cleaning

Figure 1.2 After 5 minutes of cleaning

Figure 1.3 After 8 minutes of cleaning

Figure 2.1 After 5 minutes of cleaning

Figure 2.2 After 8 minutes of cleaning