Designation: E1635 – 06 (Reapproved 2011)

Standard Practice for Reporting Imaging Data in Secondary Ion Mass Spectrometry (SIMS)[1]

This standard is issued under the fixed designation E1635; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice lists the minimum information necessary to describe the instrumental, experimental, and data reduction procedures used in acquiring and reporting images generated by secondary ion mass spectrometry (SIMS).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E673 Terminology Relating to Surface Analysis (Withdrawn 2012)[3]

E1504 Practice for Reporting Mass Spectral Data in Secondary Ion Mass Spectrometry (SIMS)

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, refer to Terminology E673.

4. Summary of Practice

4.1 Experimental conditions and reporting procedures that affect SIMS imaging data are presented in order to standardize the reporting of such data and to facilitate comparisons with other laboratories and analytical techniques.

5. Significance and Use

5.1 This practice is to be used for reporting the experimental and data reduction procedures to be described with the publication of the data.

6. Information to be Reported

6.1 Standard information to be reported may be found in Practice E1504. This information pertains to the type of SIMS instrumentation used, the mounting of the specimen, and the experimental conditions. For imaging SIMS analysis, additional information is required on the acquisition and display parameters for each image. The information reported will depend primarily on the type of SIMS instrumentation used. Two distinct instrumental configurations are used for ion imaging: the ion microscope and the ion microprobe.

6.2 *Experimental Conditions for Acquisition of Ion Microscope Images*—For stigmatic ion imaging, the mass spectrometer ion optics project a mass resolved secondary ion image that preserves the lateral relationship between ions sputtered from the sample onto the plane of an imaging detector. Whenever stigmatic ion images are recorded the configuration of the secondary ion optics should be reported, including the use and settings of contrast apertures, energy resolving slits, mass resolution, and so forth. All information regarding the condition of the mass spectrometer that influences the spatial resolution of the image should be reported.

6.2.1 *Camera Based Systems*—Camera-based systems image photons that are produced from the impact of ions onto an appropriate conversion device. In many cases, the secondary ion image is visualized via ion-to-electron conversion at a micro-channel plate placed in front of a fluorescent screen.[4] The image resolution (typically 0.5 to 1 μm) depends on the configuration of the ion optics and the energy and angular distribution of the sputtered ions. The ion image is recorded from the fluorescent screen by a variety of camera systems, including but not limited to vidicon cameras, intensified cameras such as the SIT camera, charge-coupled device (CCD) cameras and slow-scan scientific grade CCD cameras. The design of the micro-channel plate assembly and camera system

[1] This practice is under the jurisdiction of ASTM Committee E42 on Surface Analysis and is the direct responsibility of Subcommittee E42.06 on SIMS.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Lapareur, M., *Rev. Tech. Thomson-CSF*, Vol 12, No. 1, 1980, p. 225.