

Innovations in Knowledge Management with GMS

Jacob Wilbrink* and Robin T. Harmon*

* Gatan Research and Development, 5794 W. Las Positas Blvd, Pleasanton, CA 94588

In recent decades digital imaging has become increasingly common in electron microscopy but the management and presentation of the digital data is still poorly handled. In this presentation we discuss changes under way within the Gatan Microscope Suite (GMS) that ease both the data management and report generation issues.

Data management in the past revolved around the storage of prints in filing cabinets. With the advent of digital cameras microscopists now collect more images and often save them on internal and external hard drives and other back-up devices. Retrieving a particular image can be a problem. Several applications have attempted to address this concern, e.g. [1] and [2]. Data presentation was also primitive and even now absorbs large amounts of operator time in laying out and annotating pages of images and text.

The GMS has included a rudimentary reporting feature for many years but it has shortcomings:

- Only one layout “template” can be stored. It is not possible to create one report style for a TEM image and another for a STEM image, each including their specific meta-data.
- The GMS provides a pre-defined set of meta-data that can be used. The user cannot expand upon this set and automatically create reports using the expanded set.
- Reports can contain only one image. Experiments, however, often give rise to several related images and meta-data (a 3-window EFTEM acquisition for example). The GMS allows you to create a report of this type manually, but it is laborious, and not to be undertaken lightly.

We have developed an image archiving and reporting solution as an extension to the GMS that addresses these limitations and goes further. Some of the highlights of this new system are:

- An industry standard Microsoft SQL Server relational database is used. The data is archived in a 3-level hierarchy. Each level can be custom configured with its own meta-data. This structure covers applications where data gets stored in the hierarchy User-Sample-Experiment or Job-Sample-Microscope (see Figure 1).
- The database can be accessed through the web or from within the GMS. In either case it is possible to search for images and generate reports. Searching is done in a “Google” style through one simple search field. Images can be added from within the GMS and all relevant meta-data are automatically added once the “session” is defined. Through the web interface it is possible to search a remote database and load selected images in your local copy of GMS.
- Reports can be defined and customized by the user. Reports may contain any number of related images on one report page. We use the Microsoft SQL Server Reporting Services which provides many tools to conveniently design and create custom reports.

This new tool makes it much more convenient to archive and access data, and to design and create reports.

References

- [1] iTEM by Olympus Soft Imaging, http://www.soft-imaging.net/en/2343_5832.htm
 [2] Quartz PCI by Hitachi High Technologies, <http://www.hitachi-hita.com/pageloader~type~product~id~73~orgid~42.html>

The screenshot displays the AMS web interface. At the top, there are navigation links: FIND, DESIGN, HELP, BACK, and SIGN OUT. The AMS logo is in the top right. On the left, there is a 'SEARCH' and 'BROWSE' section. Under 'BROWSE', a tree view shows folders: 200201 Liu, 2002032 Lanzerotti (selected), Sample 5B, JEOL 2100F (selected), Sample 3C, Sample 2G, 2002115 Gray, 2002113 Liu, 2002259 Stevens, 2002272 Stevens, 2002528 Benz, and 2002588 Vogel. Below this is a 'COLLECTIONS' section with 'Latest Images (20)', 'For Report (12)', and 'Add a Collection'. The main content area is titled '120 Items in JEOL 2100F Folder' and shows a grid of image thumbnails. A pop-up window is overlaid on the grid, displaying metadata for a selected image. The metadata is organized into three sections: Job, Sample, and Microscope.

Job	
Number	2009999
Requestor	Tom Connelly
Problem Type	Foreign Material
Problem Description	Characterize silicon defects
Techniques	BFTM STEM

Sample	
Name	5B
Type	Plan View
Preparation Method	Mechanical
Product	Memory
Base Technology	CMOS4

Microscope	
Name	JEOL 2100F
Acceleration Voltage	200 kV
Magnification	300 kx
Illumination Mode	STEM
Camera	no

FIG. 1. The Image Archiving System for the Gatan Microscopy Suite. This figure shows the Browse screen in the web interface. In the section on the left the user can browse through the folders of data. The panel on the right shows all of the images in the selected folder. A pop-up window displays the meta-data of the selected image.