

MoniTEM: An approach to reduce electron microscope downtime by automated monitoring

Matthias J. Brunner¹, Guenter P. Resch¹

1. IMP-IMBA Electron Microscopy Facility, Institute of Molecular Biotechnology of the Austrian Academy of Sciences, Dr. Bohr-Gasse 3, 1030 Vienna, Austria

guenter.resch@imba.oeaw.ac.at

Keywords: Transmission electron microscope, Monitoring, Uptime, Downtime

High-end transmission electron microscopes are complex and sensitive instruments. Failure of one of the external supplies, malfunction of the microscope hardware or maloperation are typical reasons for subsystems to fail. Especially if undiscovered for a longer period of time, this can cause unnecessary downtime, compromising user access and increasing operating costs. Utilising the software introduced (“MoniTEM”), we have succeeded to reduce downtime of our FEI Tecnai Polara by coupling constant monitoring of critical subsystems with automatic, remote feedback, ensuring immediate problem solving.

MoniTEM is a lightweight 32-bit binary executable for Microsoft Windows 2000 or higher. The software interacts with the microscope via the Tecnai or the TEM Scripting Adapter, available from FEI as an accessory for Tecnai or Titan TEMs, restricting the use of MoniTEM to FEI TEM products. It is intended to run as a system service, i.e. in the background, independent of a user login.

Due to the delicacy of performing major changes in the software configuration of the microscope control computer, no additional components or installation procedures are required except for the binary itself and a text configuration file. In this text file, the parameters to be monitored can be specified and individually adapted for each microscope. An exemplary list of parameters we monitor on the Polara in our facility is shown in Figure 1.

In case of microscope failure, MoniTEM takes an exclusively passive approach, not attempting to resolve the problem on its own. It utilizes several mechanisms such as e-mails and mobile phone text messages to notify the microscope's supervisor. Furthermore, our tool allows logging of Scripting Adapter variables over time.

The software is freely available from <http://www.imba.oeaw.ac.at/monitem> and can be readily adapted for use with other FEI transmission electron microscopes.

1. We would like to thank Quentin de Robillard, MPI for Molecular Cell Biology and Genetics, Dresden, Germany, and Dr. Johannes Bernardi, USTEM, TU Vienna, Austria, for allowing us to test the software on microscope configurations other than our own and their feedback. This work became possible through the support by the City of Vienna/Zentrum für Innovation und Technologie via the Spot of Excellence grant “Center of Molecular and Cellular Nanostructure”.

-
- TEM Server connectivity
 - Vacuum system status
 - Vacuum gauge status in gun, column and camera
 - Vacuum level in gun, column and camera
 - High tension system status
 - High tension setting
 - CompuStage status (to report pole touches etc.)
 - Projection mode status
 - Disk space on local system hard disk and network shares for data storage
-

Figure 1. Parameters monitored on the authors' Tecnai F30 Polara