Electron Microscope Training

Electron microscopes are complex, delicate, and expensive instruments. Extended down time due to operator error can be financially costly, and will limit the ability of other researches to accomplish their research. Consideration is given to several factors when determining the training options for each user, and the training of users on the electron microscopes in the EML is not one size fits all. With all potential training plans, sufficient proficiency in the eyes of the EML PICs must be demonstrated before a user is allowed to use an EML microscope unsupervised. The following are the most prominent training considerations.

SEM training

Training on an EML SEM depends on a user's previous SEM experience and his/her expected length of stay at Los Alamos. Users who will be at Los Alamos for more than three months can be trained on an EML SEM regardless of previous SEM experience. Users who will be at Los Alamos for less than three months (concurrent) can be trained on an EML SEM if they have previous SEM experience. Ideally, in both cases, initial training should occur within one month of the initial request. Initial SEM training typically requires a single four-hour session. More advanced SEM techniques such as EBSD/EDS/TKD will be taught only after users can demonstrate competence in general SEM operations. While it is important to give summer students rewarding experiences at Los Alamos, training of summer students on an EML SEM is impractical. Instead, summer students are encouraged to accompany their mentors, a team member, or other experienced SEM users during SEM sessions.

FIB training

A FIB is considerably more complicated than an SEM. Training on an EML FIB depends on a user's previous FIB experience and previous SEM experience. Users with significant previous FIB experience will be trained on an EML FIB, and the training will generally occur within one month of the initial training request. Initial FIB training typically requires a single four-hour session for experienced users and two four-hour sessions for inexperienced users. Users with little previous FIB experience will be asked to prove competence in general SEM operations prior to being trained on a FIB. In addition, the user may be asked to attend several FIB sessions with an advanced FIB user prior to FIB training. As such, it may take 2-6 months before an inexperienced FIB user is trained on an EML FIB after training is requested.

TEM training

A TEM is a significantly more complicated instrument to operate and TEM data is generally far more complicated to interpret than SEM data. It is generally expected that users needing TEM training at Los Alamos will have previously had a graduate level TEM course and some hands on TEM experience. These users should be trained within 1 month of a training request on the Tecnai TEM. Initial TEM training typically requires single four-hour session for experienced users, and between three and six four-hour sessions for inexperienced users. Initial training covers safe TEM operation and data collection

best practices for basic TEM modes. More advanced subjects (EDS, EELS, STEM, etc.) will be taught only after users demonstrate proficiency in basic TEM operation. Competent Tecnai users are eligible to be trained on the Titan TEM after demonstrating sufficient proficiency, generally after between 1 and 6 months depending on previous TEM experience. Users with little previous TEM experience will need further self-study prior to training on an EML TEM. A couple of universities offer week-long hands-on TEM training courses that the EML highly encourages new users to attend. There are also a couple of universities that offer online TEM courses. An EML PIC will help guide inexperienced users to the available courses. An inexperienced TEM user will be required to take one of these courses as well as to buy and read the first ¼ of Williams and Carter, and then demonstrate an understanding of the material. It is expected that this endeavor will take 3-6 months.

Note that every effort will be made to provide training in a timely manner, but instrument downtime or heavy request loads during busy periods may extend the time required to complete training. It is best to plan ahead!