Training Strategy for ENM group instruments (during COVID-19 pandemic)

In order to safely train new users and others (postdocs, other staff, etc.) during the COVID-19 pandemic, we propose a set of safety protocols that build upon the general safety rules instituted by BNL and CFN. We define a set of common protocols, which will be implemented in all training situations, and a set of tool-specific protocols.

Common Training Protocols

When face-to-face training is required between a CFN staff members (trainer) and a CFN user (trainee), both participants will adhere to the following protocols:

1. Face-to-face training will be used only **where necessary** and where other methods (such as virtual interactions) cannot suffice.
2. Trainer and trainee will follow all BNL and **CFN protocols**, including:
    a. wearing a face-mask and gloves at all times in laboratories
    b. maintaining distance (>6 ft) wherever possible and minimizing time spent in the vicinity of others
    c. cleaning common-touch surfaces where necessary
    d. observing room occupancy limits
3. Training will be performed for **one person at a time**.
4. Trainee will have performed all applicable **web-based and video trainings** ahead of time, so that they are as familiar as possible with the tool. Trainer will (where possible) describe tool operation to trainee first over video-conference (or in-person with distancing) so that time spent together at the tool is minimized.
5. When direct hands-on demonstration of a tool is required, trainer and trainee will **alternate approaching the tool**. The trainer will approach the tool and demonstrate (while trainee distances as much as possible; ideally 6 ft); only once trainer has stepped away will trainee approach tool to perform the operation themselves.
6. Both persons will wear **face shields or lab glasses** (in addition to face masks).

Alternative Protocols

The following lists some additional protocols that are being evaluated, and may be implemented in the training for particular tools, to further increase safety.

- A detailed training manual, including pictures, will be created by CFN staff, acting as training material that streamlines face-to-face interaction and becoming a resource for

users during tool use. This may be a new document, or the addition of detail/photos to existing SOP documents.
- A specialized training video will be created for that instrument/tool. This can act to streamline face-to-face training (reducing training time) or (in some cases) may replace in-person training.
- The output of a tool's computer system will be mirrored to a nearby display, allowing trainer and trainee to both look at the computer output without being close to one another.
- An on-body video camera, streaming to a nearby monitor, will allow the trainee to see the trainer's actions in real-time, thereby allowing learning without standing close to one another.
- Remote interaction (video-chat via web-tablet) will be used so that the trainer can talk to the trainee as they operate the tool, providing them with guidance without being in the same space as them.
- Remote desktop software or hardware will be used so that the trainer can operate the computer remotely, in tandem with trainee. This will allow guidance to ongoing work without being in the same space.
- CFN staff can synthesize materials or operate tools on behalf of users. That is, training will be avoided by substituting staff usage of CFN capabilities.

Tool-specific Training Protocols

The following tool-specific protocols will be implemented, **in addition** to the common protocols described above.

Materials synthesis and characterization tools (1L10 and 1L35) [Chang-Yong Nam]
- Occupancy limit for 1L10 is 3 people; for 1L35 it is 2 people.
- Surfaces touched using bare hands will be cleaned using disinfectant and paper wipes available near the lab entrance.
- Trainer may use video tools (Facetime, bodycam, or other) to facilitate viewing while maintaining distancing.

ALD (1L10) [Gregory Doerk]
- G. Doerk will prepare a new SOP, including screen shots and photos of parts of the tool to illustrate key points. Trainee will review these materials prior to training.

March Etcher (1L10) [Gregory Doerk]
- Trainee will be referred to the SOP posted on the wall behind etcher as much as possible.

Hitachi SEM (1L32) [Gwen Wright]

- Trainee will watch training video prior to in-person training: https://www.youtube.com/watch?v=BdKwRVe4OFk
- Trainee will review written SOP kept with the Hitachi SEM.

General wafer processing for self-assembly (1L10) [Gregory Doerk]

- Spin-coater manual will be available for reference.
- Spin-coater operation will be demonstrated by an alternating approach as outlined in the common protocols.

Solvent vapor annealing (1L03B) [Gregory Doerk]

- G. Doerk will prepare an SOP for this method, including screen shots and photographs. Trainee will review these materials prior to training.

ESD tool (1L03B) [Gregory Doerk]

- For the time being, users will not be trained on this tool. G. Doerk will prepare samples when required for user projects.

DSC/TGA (1L03B) [Gregory Doerk]

- For the time being, users will not be trained on this tool. G. Doerk will characterize samples on their behalf.