MSE672–Lab 1: Basic Imaging

John Dunlap and Gerd Duscher

February 10, 2021

1 Objectives

- Knowledge of system components
- Basic alignment of TEM
- Acquisition of images

2 System

- Operational status and vacuum system of TEM
- Identification of electro-optical parts of TEM
- Basic functionality of computer control

3 Hands on Exercise

1. Focus of sample – gold nanoparticles on carbon
2. Changing the illumination system
3. Aligning *Illumination Tilt*
4. Changing the projector system
5. Acquire images with different magnifications (mark clearly the indicated magnification)
6. Measure (ruler) the distance between middle of objective lens and objective aperture

4 Homework I

Calibration of magnification and rotation of a set of images.

a.) Make ONE aesthetically pleasing PPT slide or jupyter notebook from all images acquired in your laboratory course section.

b.) Calculate approximate magnification of objective lens (lens gap is 2.2 mm and sample sits in the middle)

5 Image Analysis software for SEM and TEM

- **Digital Micrograph**: You can get a free offline license from here: `https://www.gatan.com/resources/scripting/demo/`

- **ImageJ**: a free imaging software with a lot of plugins download from here: `https://rsbweb.nih.gov/ij/`

- **jupyter notebook**: use provided jupyter notebook `https://github.com/gduscher/MSE672-Introduction-to-TEM`