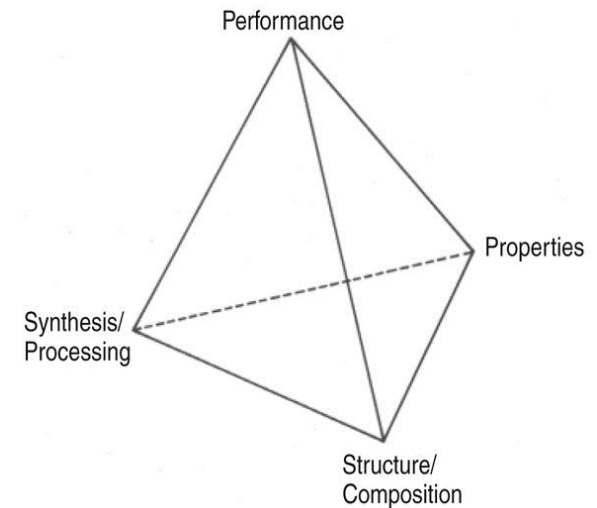# Materials Science and Movie Processing

(Or… what I learned this summer at Sandia)

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SAND2012-6188P

Materials Science and the IBL

Materials Science

- Study of the structures and properties of materials
- Incorporates physics, chemistry, and engineering
- Optimizing Structures

Materials Science and Engineering for the 1990's: Maintaining Competitiveness in the Age of Materials
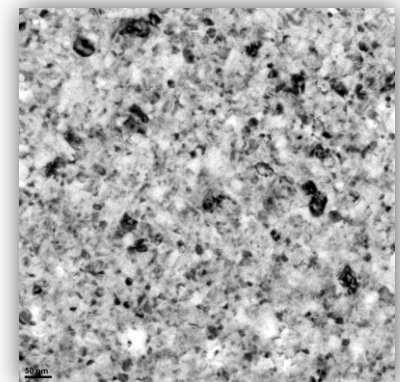
The Ion Beam Lab (IBL)

- Modifications at the nanoscale
- Ion Beam Modification
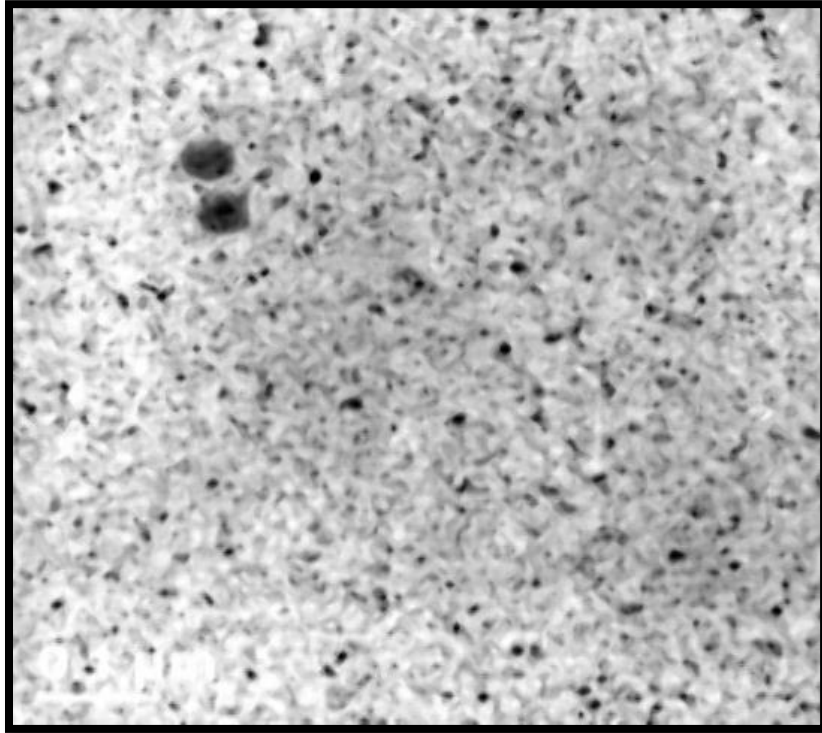- Characterization by Transmission Electron Microscopy (TEM work)

My Work

- Annealing thin film Nickel to 600 C and 700 C
- Analyzing the results of Nickel experiments
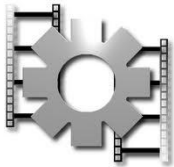
The Ion Beam Lab

Nickel Sample

2

My Summer Project

Raw Video

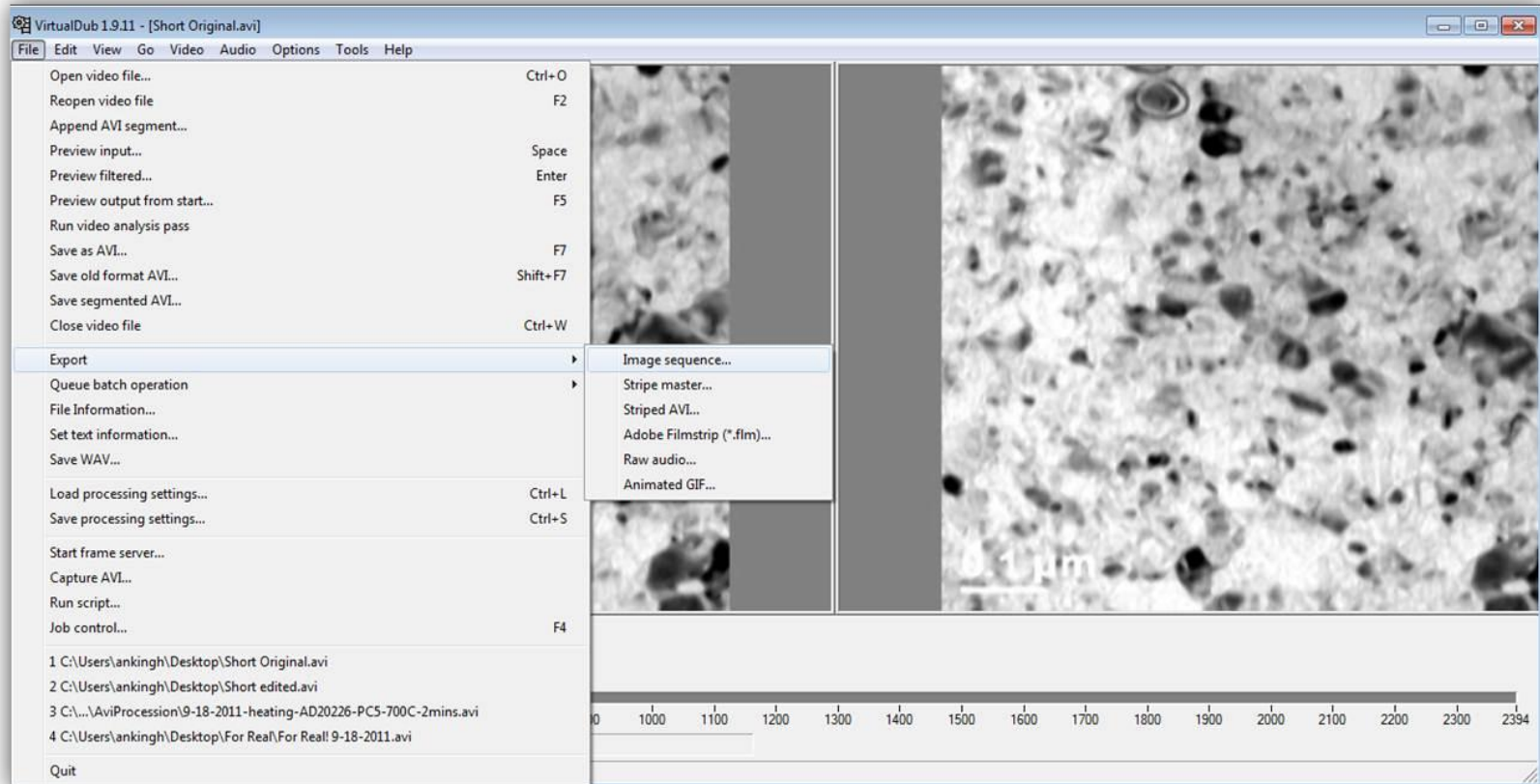| Image Number	Grain Area (nm)
4	497.566
5	597.620
6	598.972
7	277.177
8	186.587
9	358.302

Experiment Results

To process video from a nickel thin film heating experiment and compile the results of the experiment.

Step 1: VirtualDub

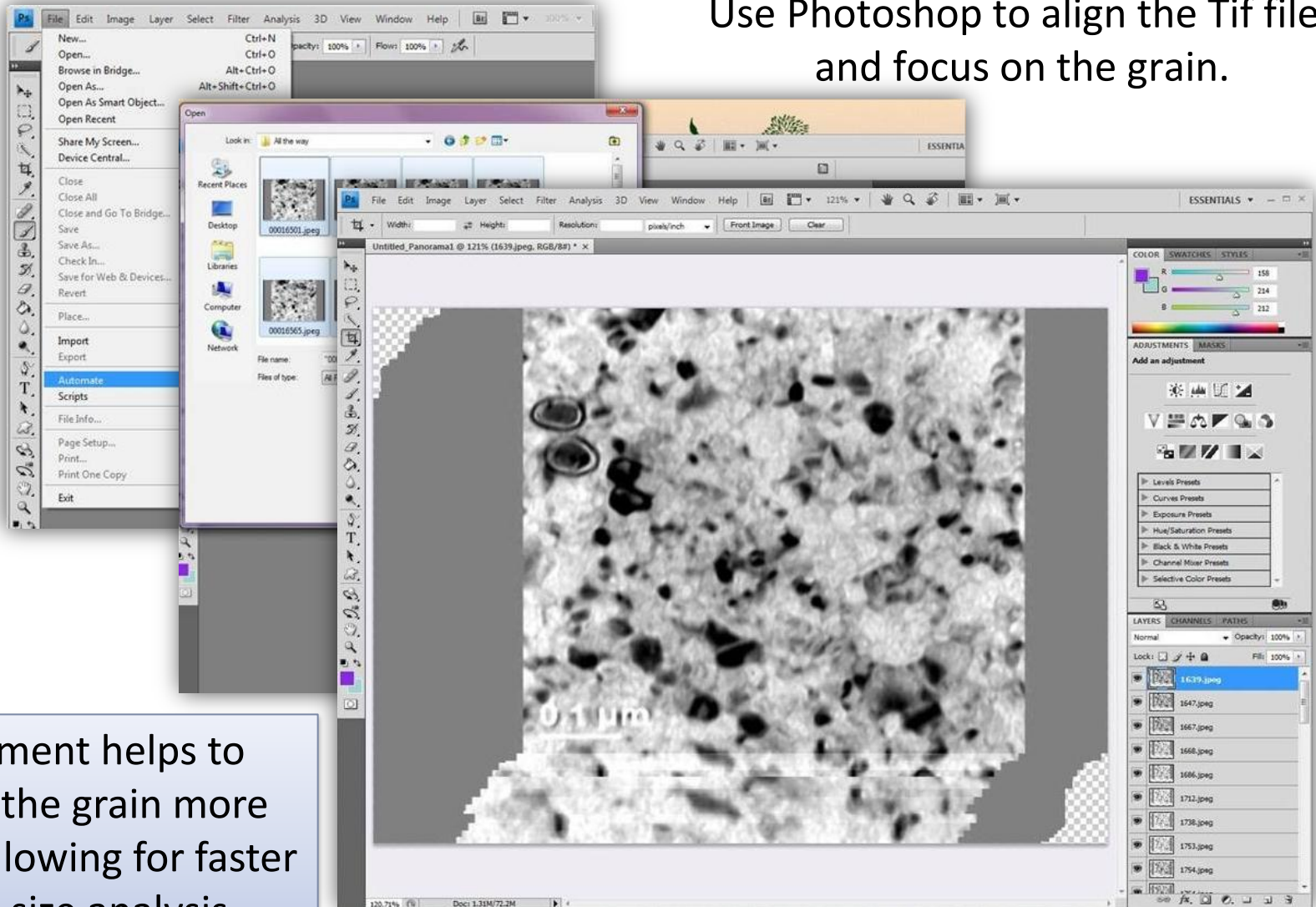Find and Follow the grain of interest then export Tif files

The grain area cannot be measured from a video file, so Tif files are a necessity.

Step 2: Adobe Photoshop

Use Photoshop to align the Tif files and focus on the grain.
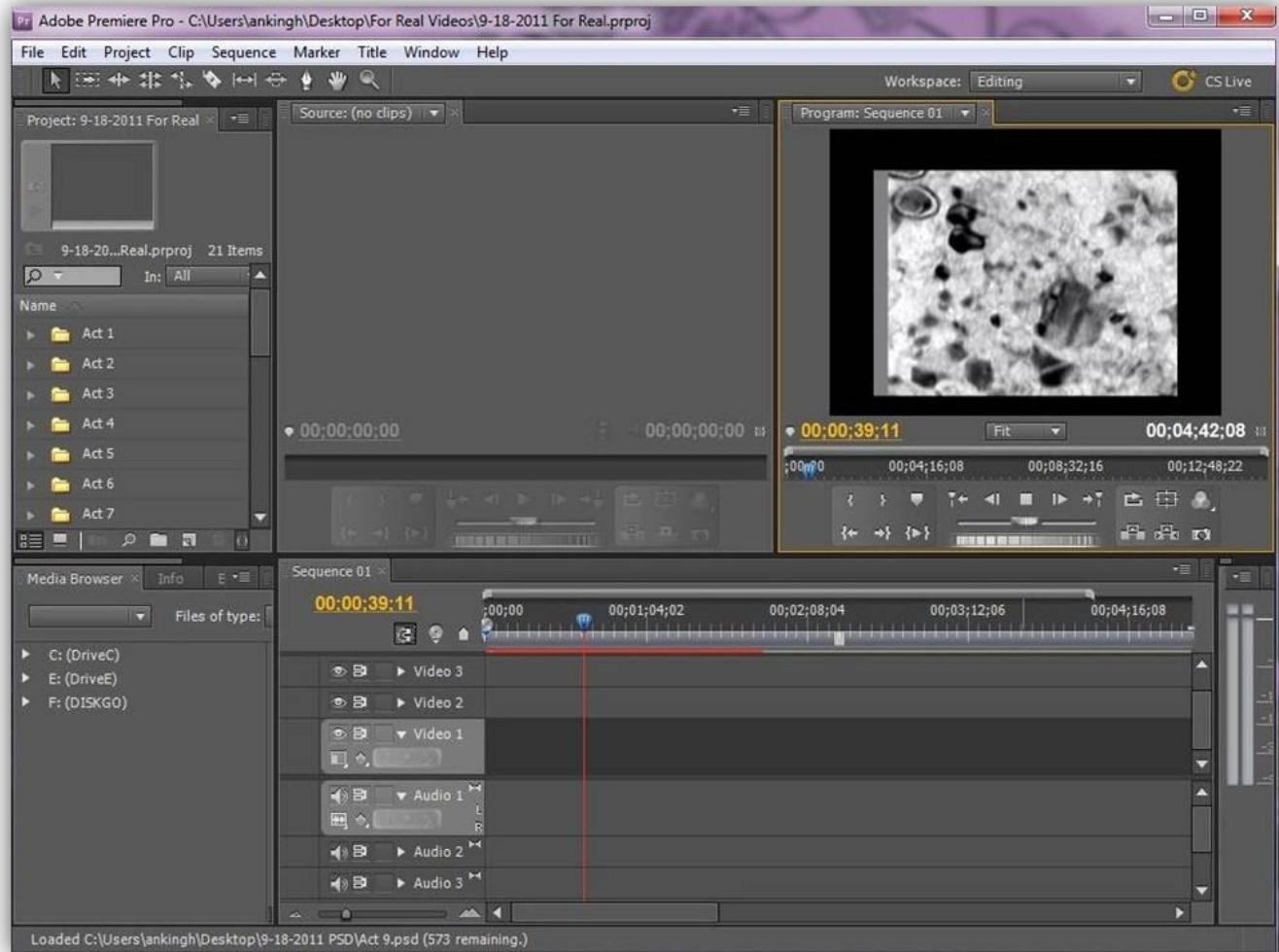

Alignment helps to locate the grain more easily, allowing for faster grain size analysis.
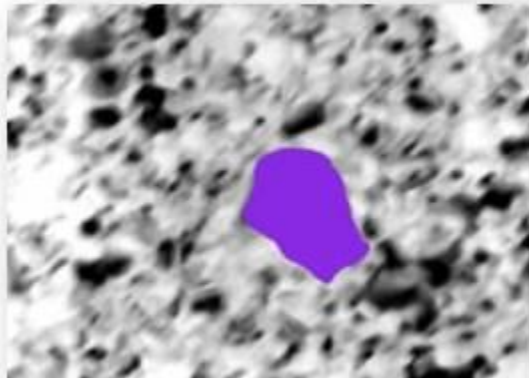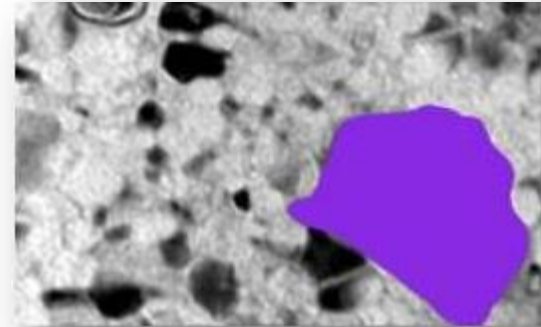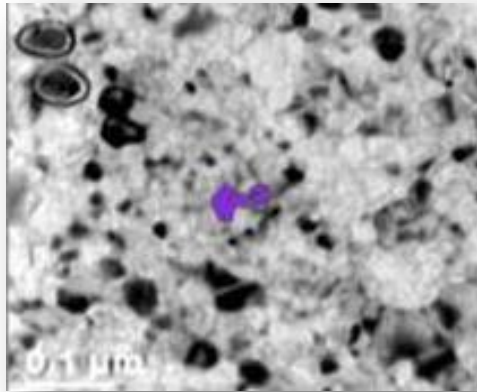
Step 3: Adobe Premiere

Once the Tif files have been aligned and cropped turn them back into a movie using Premiere.

The new movie helps people who aren't familiar with the video follow the grain more easily and understand better what is happening.
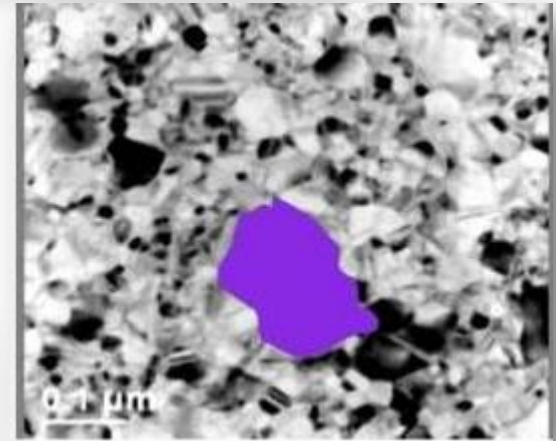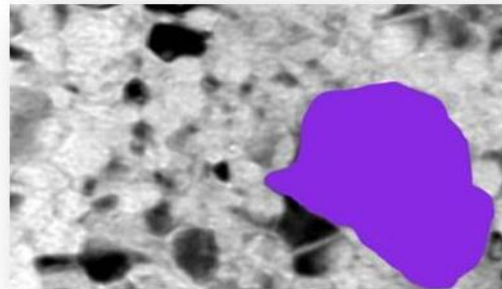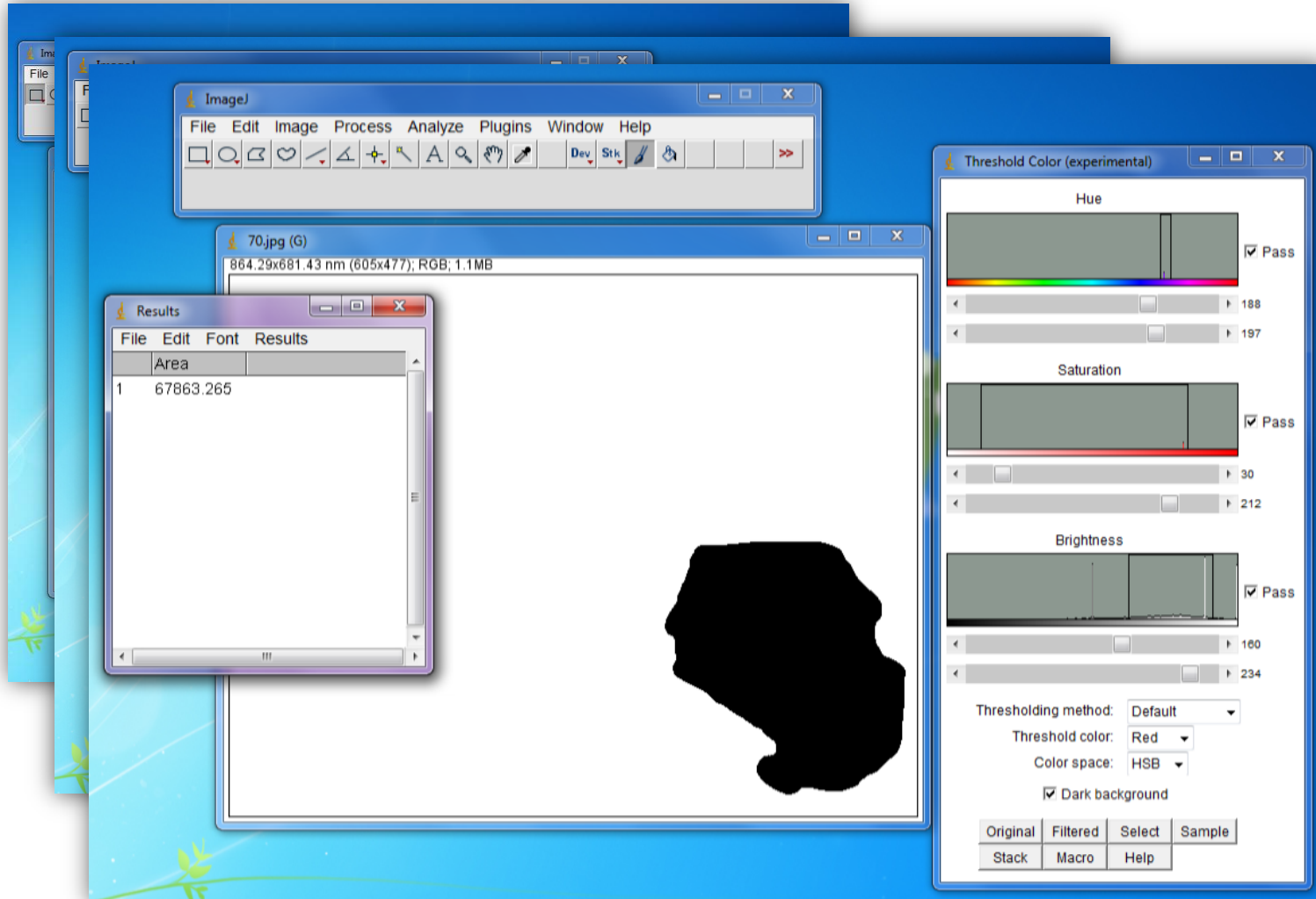
Step 4: Back to Photoshop

In Photoshop color the grain using the paint tool.

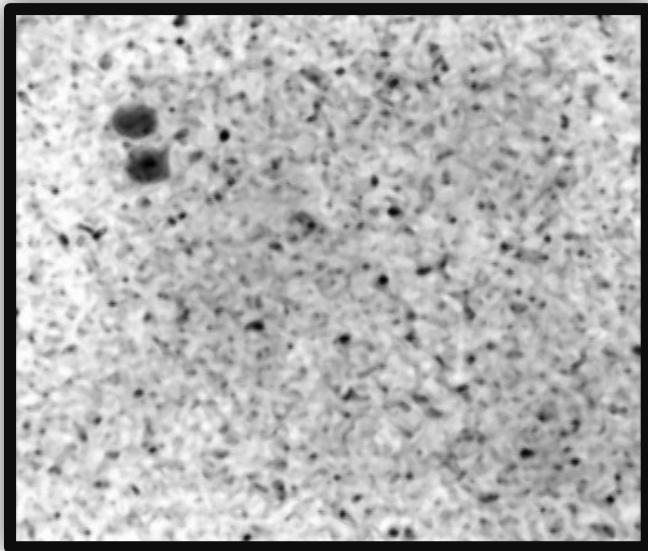The colored area can then be measured, giving the approximate grain size.
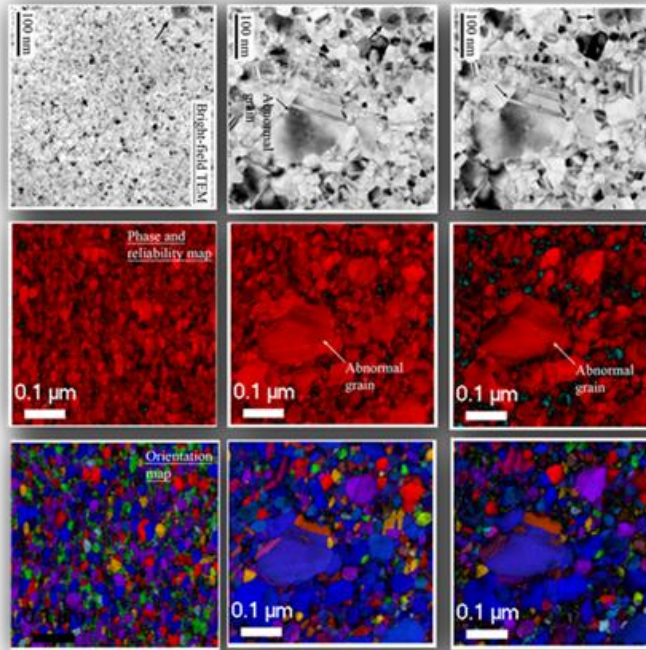
Step 5: ImageJ

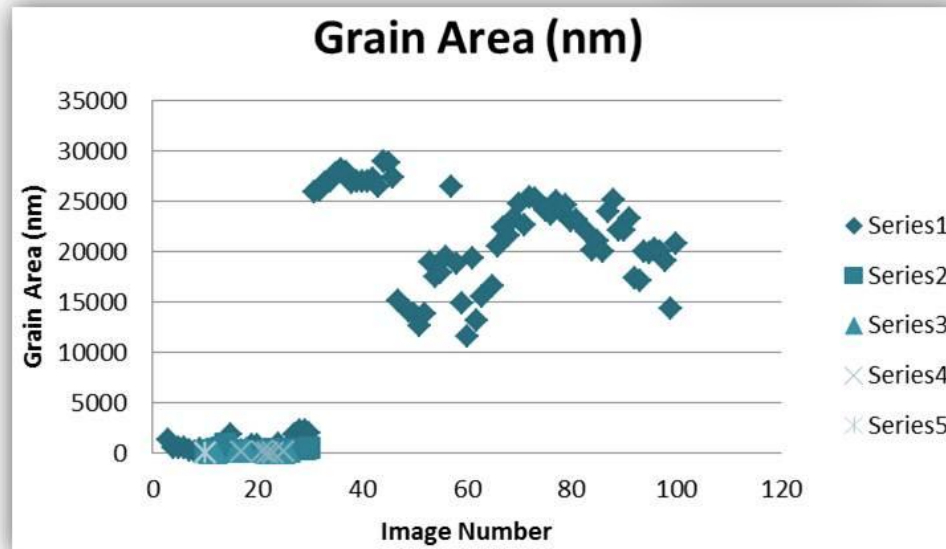Use ImageJ to create a binary image and determine the area of the grain.
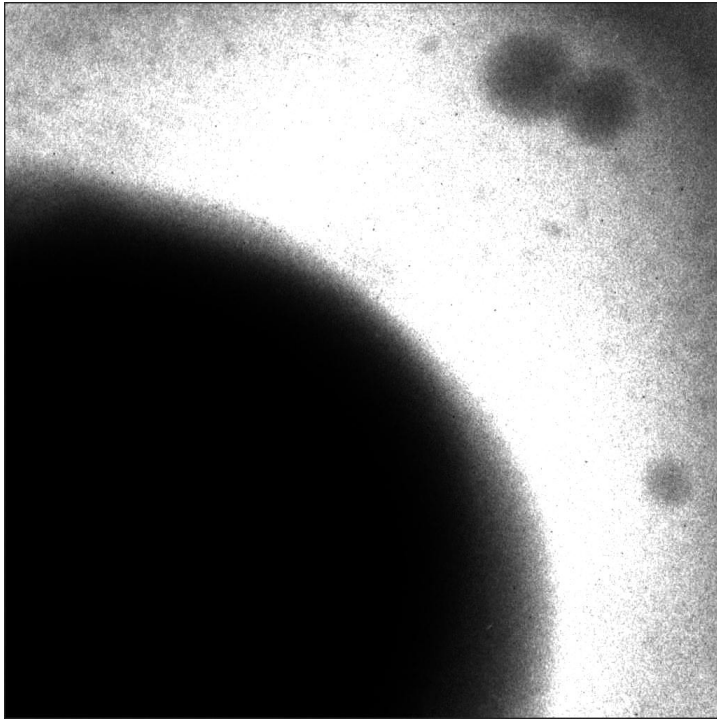
Results

Processed Video

FCC
HCP

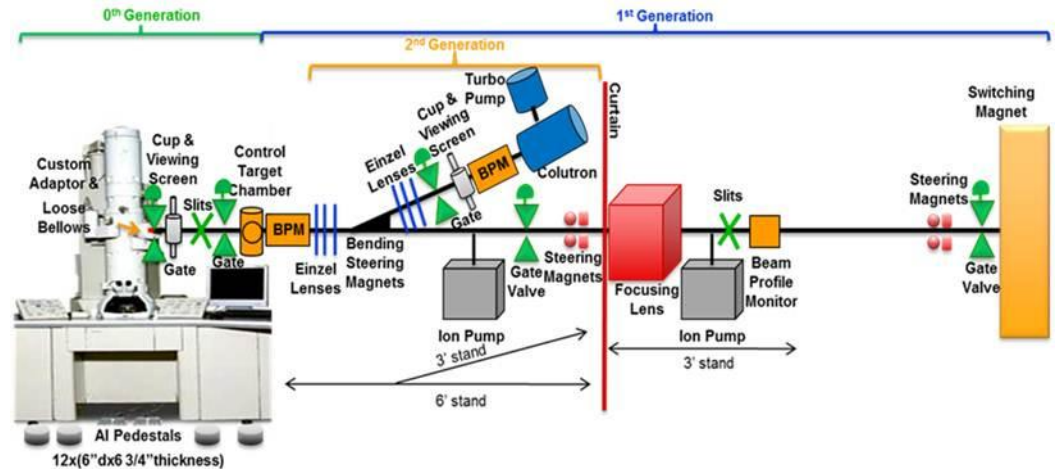Bright Field Images, Phase Maps, and Raw Orientation Maps at 0 sec, 120 sec, and 300 sec

These results will be used, along with the results of other experiments, to develop and refine devices that contain Nickel.
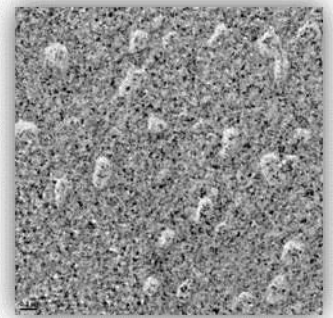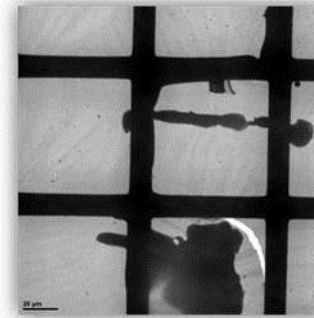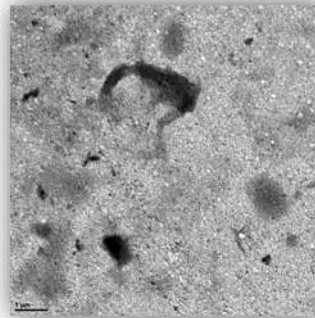
Side Projects

Adjusting the brightness and contrast in TEM movies to more easily view the nanoparticles.

Measuring the TEM and learning all the parts

Sample Prep: Preparing thin film nickel samples on copper grids

Special Thanks to Melissa Dosanjh, Sarah Hoppe, Shreyas Rajasekhara and Khalid Hattar for all your help this summer! 10