

## Study Session 3: Introduction to Matplotlib

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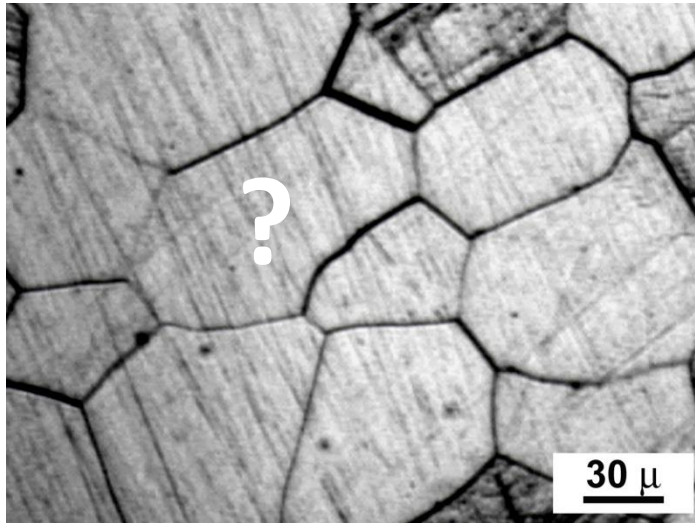


Figure 1 – Material grain size

### Problem:

Now that your oven process is working you have been able to fabricate materials with 5 different grain sizes ranging from 30  $\mu\text{m}$  to 200  $\mu\text{m}$  (Figure 1). The goal of changing the grain sizes in the material is to see if the conductivity is affected as a function of grain size.

Using image analysis software, you have calculated the average grain size for 40 different samples for each of the 5 different processes. You have also measured the conductivity of each of the 40 samples. Now that the study is complete you have compiled these values in a .csv file.

Now you would like to visualize this data. Your supervisor has asked you to present the data you have collected in multiple different ways. You are tasked with plotting this data in the following ways:

- Scatter plots for each process plotted in a single figure (use subplots)
- Histograms for each process plotted in a single figure (subplots):
  - With a total number of bins = 10
  - With a total number of bins = 30
- A scatter plot of the entire data set
- A line plot of the data set means and appropriate x and y standard deviations

### Set-up:

In order to solve this problem you must write a program in python that imports the data into a NumPy array from the 'conductivity data.csv' file, computes the necessary descriptive statistics and returns the desired plots. All plots must be correctly labeled (axes labels and title) and each process should be given a different color and marker. Spend some time with the properties of each figure to make it look presentable.

### Helpful Hint:

Using NumPy you can read a CSV file into an array using the same `numpy.genfromtxt()` function as was used last week.