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%CHEM 26701
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%Atomic Force Microscopy

%Should have taken temperature!

%Import data

%The raw data files are split into extend and retract data. I have created
%DAT files with the same names with only the retract data.

%First column is "Calculated Z (nm)"
%Second column is "Deflection {nN)"

d1=importdata('ms-0422.004.dat');
d2=importdata('ms-0422.012.dat');
d3=importdata('ms-0422.017.dat');
d4=importdata('ms-0422.019.dat');
d5=importdata('ms-0422.023.dat');
d6=importdata('ms-0422.024.dat');
d7=importdata('ms-0422.026.dat');
d8=importdata('ms-0422.030.dat');
d9=importdata('ms-0422.031.dat');
d10=importdata('ms-0422.043.dat');
d11=importdata('ms-0422.044.dat');
d12=importdata('ms-0422.048.dat');
d13=importdata('ms-0422.054.dat');
d14=importdata('ms-0422.060.dat');
d15=importdata('ms-0422.061.dat');
d16=importdata('ms-0422.066.dat');

%Plot the retraction curves
%2. Show representative force-extension data. Comment.
%3. Analyse the data to determine the number of domains.

plot(d1.data(:,1),d1.data(:,2))
plot(d2.data(:,1),d2.data(:,2))
plot(d3.data(:,1),d3.data(:,2))
plot(d4.data(:,1),d4.data(:,2))
plot(d5.data(:,1),d5.data(:,2))
plot(d6.data(:,1),d6.data(:,2))
plot(d7.data(:,1),d7.data(:,2))
plot(d8.data(:,1),d8.data(:,2))
plot(d9.data(:,1),d9.data(:,2))
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plot(d10.data(:,1),d10.data(:,2))
plot(d11.data(:,1),d11.data(:,2))
plot(d12.data(:,1),d12.data(:,2))
plot(d13.data(:,1),d13.data(:,2))
plot(d14.data(:,1),d14.data(:,2))
plot(d15.data(:,1),d15.data(:,2))
plot(d16.data(:,1),d16.data(:,2))

%This is tedious. Can I just make a list and then use a for loop?

%Later will manipulate data to Newtons and Meters

$There must be a command to only multiply one column by orders of magnitude

%Define constants and such for the instrument

%Lever
k=0.03; %spring constant in N/m
f=37000; %frequency of ??? in Hz
L=60*10^-6; %length of cantilever in m
W=30*10^-6; %width of cantilever in m
t=0.15*10^-6; %thickness of cantilever in m

%Tip
r=25*10^-9; %tip radius in m
h=7.5*10^-6; %tip height in m

%3. plot the total ``numbers found in your total data set'' as a histogram.
%Does this mean the force, or the extension, or both? I'm going with force.
%Does total mean all at once?

hist(d1(:,2))
hist(d2(:,2))
hist(d3(:,2))
hist(d4(:,2))
hist(d5(:,2))
hist(d6(:,2))
hist(d7(:,2))
hist(d8(:,2))
hist(d9(:,2))
hist(d10(:,2))
hist(d11(:,2))
hist(d12(:,2))
hist(d13(:,2))
hist(d14(:,2))
hist(d15(:,2))
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hist(d16(:,2))

%It might be more prudent to go one by one.

%3. I'll need to look at the plots to get some idea of the first breakage
peak,
%and then will need to do a bunch of index calling. I'll also need to look
%at the plots to count the number of domains, among other things.

%4. To plot peak-to-peak distances, I'll need to do more index calling. It
%would be nice to be able to put these in a list, not a vector. Whatever.
%Plotting would probably involve making a histogram, and then fitting a
%Gaussian to that using a defined function and a fitting thing. Once I've
got
%that, getting the variance and standard-deviation is easy.
%The measurement is not a single value, for one, because of tiny
fluctuations
%of the tip; on a small scale, its vibrations become significant.
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