**DETERMINATION OF THE DIELECRIC CONSTANT OF BARIUM TITANATE**

**Preliminary**

Read about barium titanate.

**Measurements**

1. A barium titanate sample is in the oven. Connect the cables to the control box.
2. Plug in and turn on the control box.
3. Turn the set temp control about 2/3 of way up. Record capacitance and temperature at room temp. Turn on oven. Record capacitance and temperature at 5 degree increment until capacitance is clearly increasing.
4. Then measure in 10 degree increments until 160 deg. If the green light goes out raise the set temp control higher.
5. Turn the set control lower and turn off oven. Estimate the temperature of the peak value of the capacitance from your data. To pin this temperature down better make measurements in 1 deg. Increments around your estimated temperature.
6. When data collecting is complete shut off oven and turn off control box.
7. When finished with experiment disconnect cables and power cord.

**Analysis**

1. Plot capacitance versus temperature and determine the temperature at the peak. This is called the Curie Temperature (in analogy to the magnetic Curie Temperature). What is its significance? What happens to the crystal structure of the sample?
2. Compute dielectric constant from capacitance and plot. How much does the value change between room temperature and Curie temperature? See data below.
3. What are two practical uses of barium titanate ? Read about electrets (http://jesseenterprises.net/amsci/1968/07/1968-07-body.html), piezoelectricity, and ferroelectricity on the Internet.

 SAMPLE DATA Area= 63.05 sq.mm Thickness = 1.34 mm