Summary-Shots of YBCO Synthesis and Characterization in Summer 2008

Fig. 1. Students (Shenelle, Staci and Andre (from left to right)) working-out molar ratios needed to determine the weights of the CuO, $BaCO_3$ and Y_2O_3 powders needed for the solid state synthesis of $YBa_2Cu_3O_{6+x}$ after a tutorial on solids state synthesis and basic chemistry by Prof. Tyson.

Fig. 2. Shenelle, Samantha and Andre, weighing the starting materials (Y_2O_3, CuO and $BaCO_3$), needed to get the correct stoichiometric ratio for YBCO ($YBa_2Cu_3O_{6+x}$).

Fig. 3. Monica (from 2007) grinding powder for first calcinations sample as a example of the procedure. After grinding for 45 minutes to produce a uniform grey powder the sample was heated in air for ~24 hours at 950 ° C. This was repeated 3 times and the sample was then pressed into a pellet for the final heating.

Fig. 4. Two pellets were produced: one for testing for the Meissner effect (large one) and one used in parts for resistivity, Raman and magnetization measurements.

Fig. 5. Preparing a rectangular (polished) sample for Resistivity measurements with graduate student Tao Wu. Part of a pellet is polished into a rectangular sample and placed on circuit board (lower figure).

Fig. 6. The sample is coated with nail polish and placed in a weighing tray on top of an aluminum block. The tray is then filled with liquid nitrogen causing the "mist" in the photo on the left. The Meissner effect was observed with the magnet floating above the YBCO pellet due to expulsing of the magnetic field. In the lower figure Staci, Andre (foreground), Samantha and Shenelle look-on and take pictures with their phone cameras. Their sample does supreconduct! No need to start over.

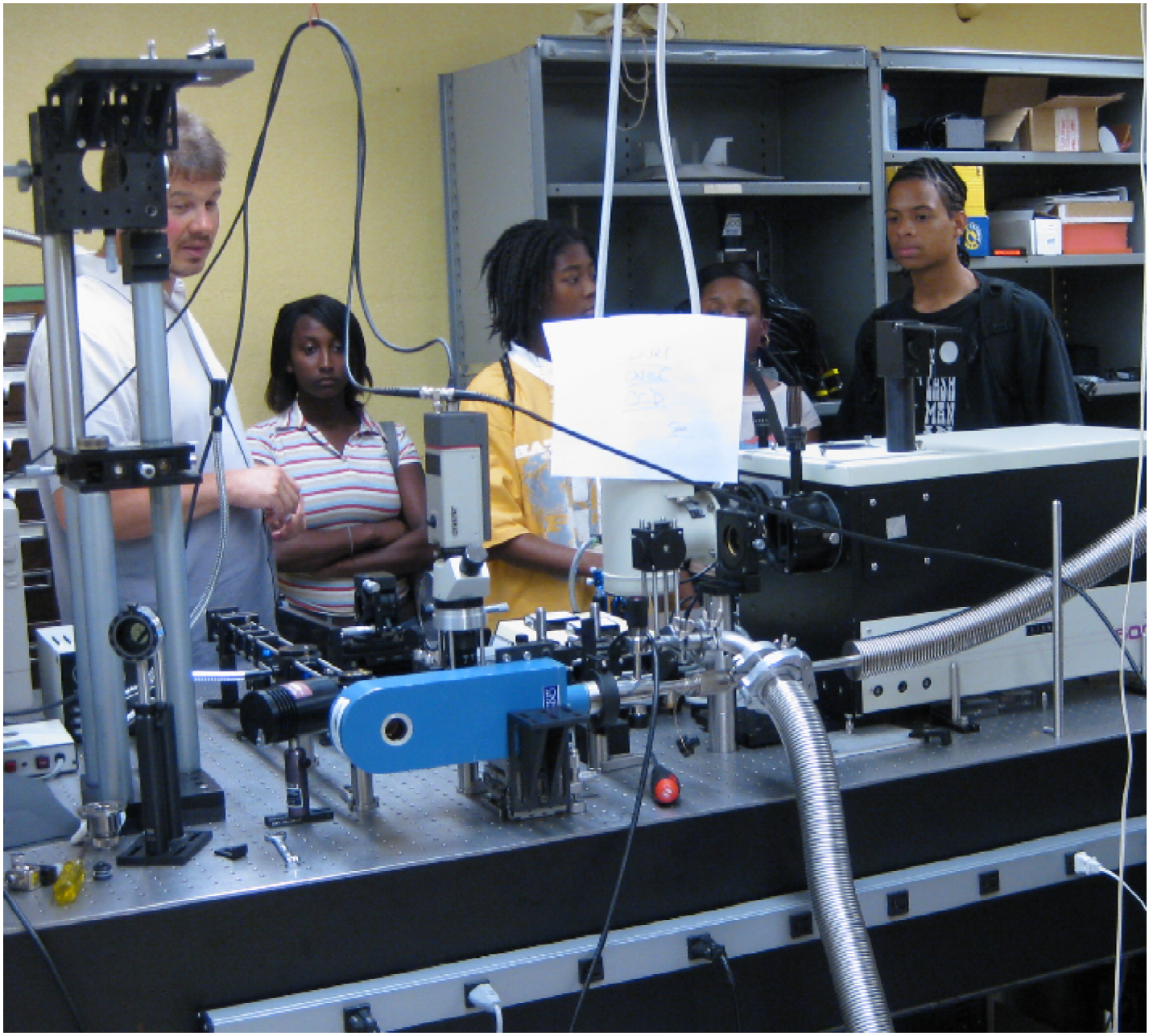

Fig. 7. The students get a tutorial on Raman scattering from Prof. Andrei Sirenko with the assistance of graduate student Peng Gao before measuring the Raman spectrum of their sample. The Raman experiments were done in Dr. Tao Zhou's Optics laboratory.

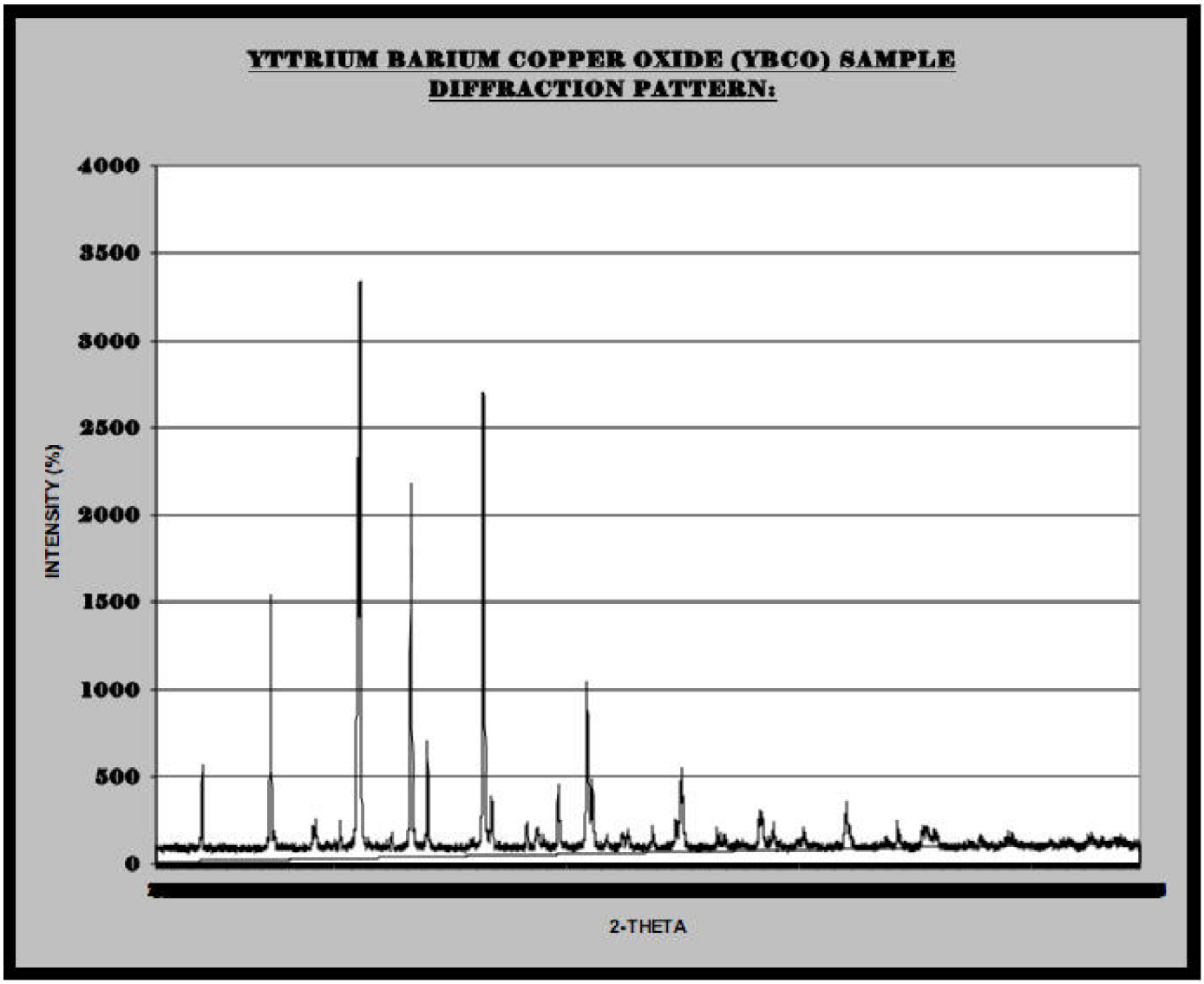

Fig. 8. X-ray Diffraction data taken on powder sample. See reports for detailed discussion.

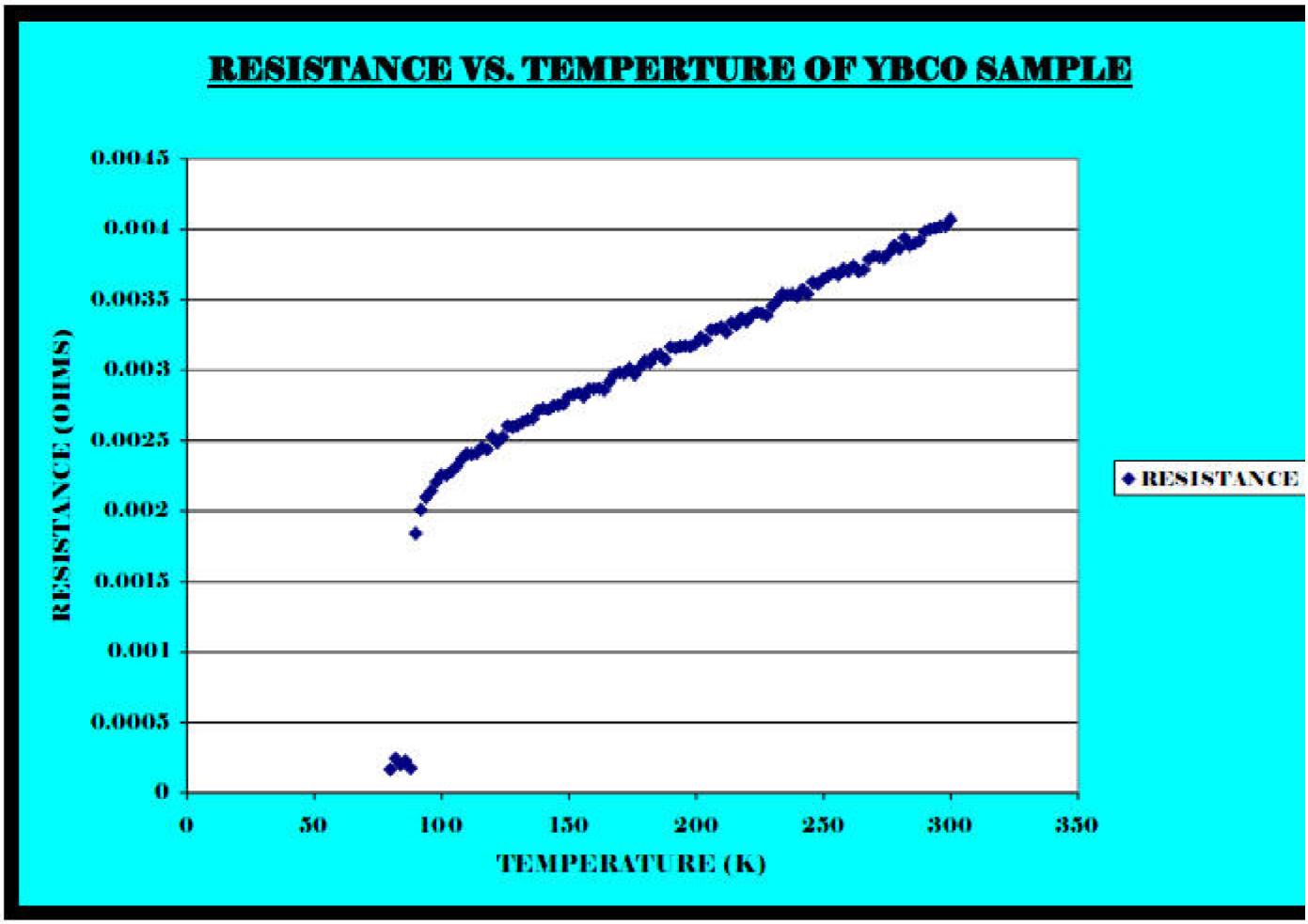

Fig. 9. Resistance data taken on the polished pellet sample. See reports for detailed discussion.

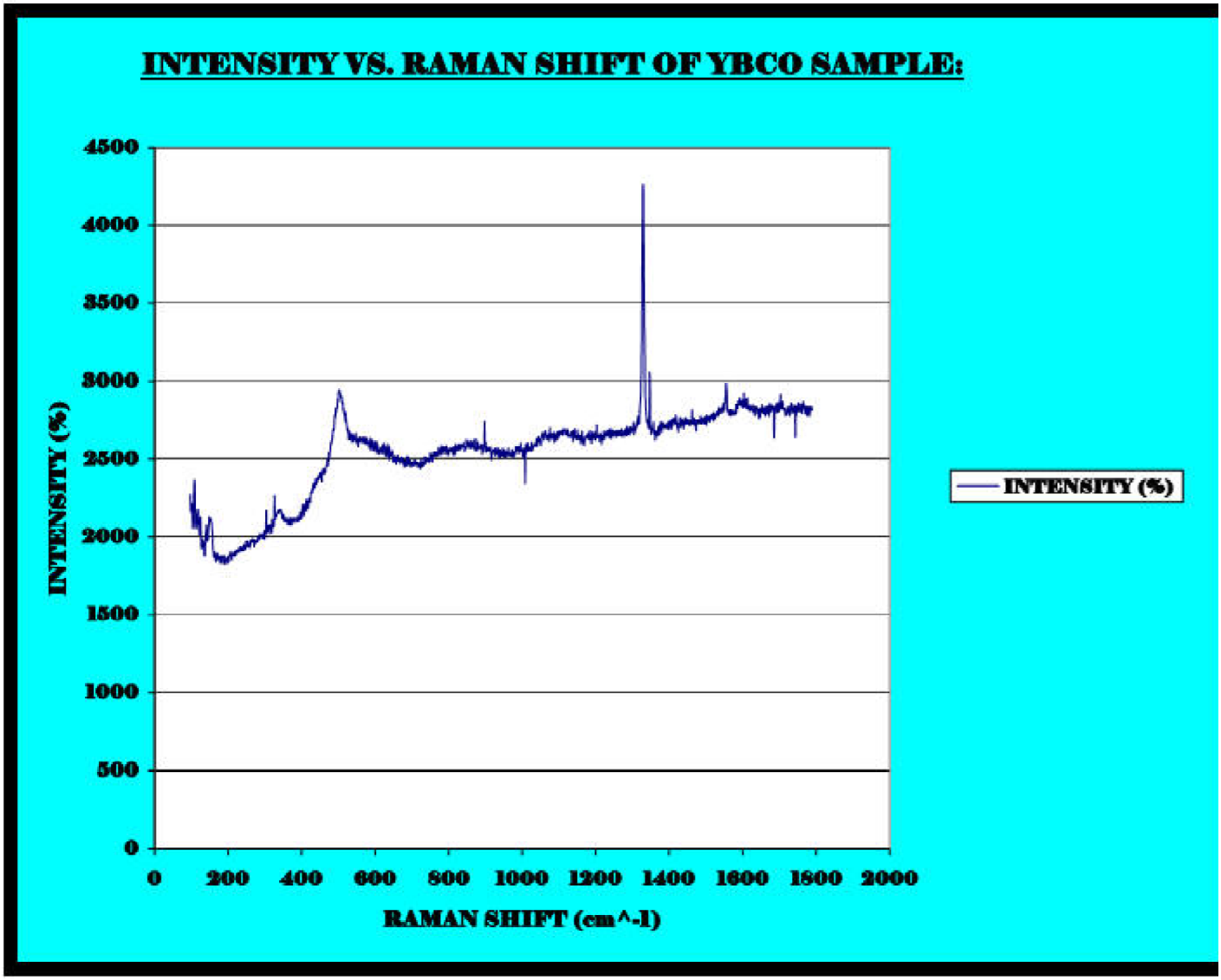

Fig. 10. Raw Raman data taken on YBCO pellet sample. A detailed discussion of the phonons modes was presented in the final reports by the students.