Using atom probe tomography spectra to teach undergraduate students

DANIEL D. GREGORY[1], DANIEL E. PEREA[2]

[1]Department of Earth Sciences, University of California, Riverside, CA 92521, USA (*Daniel.Gregory@ucr.edu)
[2]Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, 3335 Innovation Boulevard, Richland, WA 99354, USA

With the advent of ever increasing types of analytical techniques the draw backs of one over another is often lost on under graduate students, especially those without a strong back ground in chemistry. This is important especially as students are being increasingly exposed to more and more isotope systems where peak over lap of different elements in mass spectra can cause significant errors. The most effective way to teach these issues to students is to utilise an interactive classroom setting that allows students to work in groups on a puzzle, while still using real data that can be displayed in an interesting and exciting way. Atom probe tomography data provide just such a opportunity. The processed data shows the placement of atoms in a mineral of interest and how they vary within the mineral which gives an atom scale veiw of the sample, something exciting to most students of geology. Additionally the spectra itself provides an exceptional puzzle that requires the identification of peak overlaps to correctly identify the mineral in the spectra it is from. This provides a useful, fun way to use real data to teach students about isotopes of different elements, potential problems with data from a mass spectrometer (especially when measuring isotopes), and how to critically examine there own data sets and those of others.