

Collaborative Mineralogical Research in Museums

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The collections at the Natural History Museum of Los Angeles support active and vibrant multidisciplinary research and education. The Minerals Sciences Department has over 150,000 catalogued specimens and more than 130 type specimens, representing over 80% of all known mineral species. While many stunning specimens are on display, the most interesting science often utilizes small specimens that are held within our research collection and not usually shown to the general public.

As curator, my research focuses on environmental studies using *in situ* and non-destructive techniques. Time-resolved diffraction experiments are usually performed at synchrotrons, but preliminary analyses are done in-house with stop-flow diffraction experiments, *in situ* and *in operando* X-ray fluorescence, and Raman spectroscopy. One ongoing project looks at minerals with potential for radioactive waste sequestration by determining the molecular mechanisms for selective ion exchange in titanium silicates and zirconium silicates. This type of molecular research has led to industrial partnerships with pharmaceutical companies to investigate the crystal chemistry of materials like ZS-9, and with energy companies for developing asphaltene cracking for environmental remediation and fossil extraction in places like the La Brea Tar Pits. Other collaborative research projects include combined XRD and XRF for a paleoclimate research of lacustrine sediments in Mexico, aeolian alpine glacier dust characterization in Peru, discovery of low framework density microporous minerals in Arizona, and fluid-mineral interface science of halophiles in salt crystals from all over the world.