X-ray Diffraction investigations in the Smithsonian Gem and Mineral Collection

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The National Gem and Mineral Collection at the Smithsonian Institution houses over 375,000 mineral specimens and ~10,000 gems. Lurking within a collection of this size are myriad questions and problems just waiting to be tackled by X-ray diffraction. Most such work is performed using a microdiffractometer with imaging plate detector that permits rapid data collection for a variety of different types of samples from micro crystals to large gemstones. Day to day curation and loan activities require quick and accurate phase identification, which in many cases turn into in-depth research projects. Extremely rare minerals provide special challenges, e.g. not consuming the known world’s supply in the process of preparing an X-ray diffraction sample for identification. X-ray diffraction is also an important tool for gem identification, but must be performed nondestructively and sometimes with the stones mounted in jewelry. This talk will highlight several examples of applications of X-ray diffraction used in support of research and curation related to the gem and mineral collection.