A Pressure and Stress Study of Reidite

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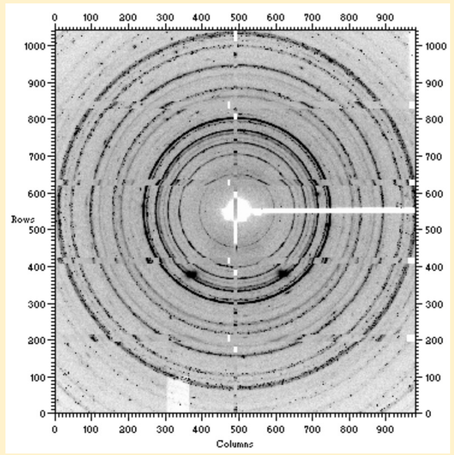
Background

- Zircon is a mineral that can commonly be found in many rocks in the Earth's crust and other planetary bodies. Meteorite impact sites have also been shown to contain zircon and its high-pressure polymorph, Reidite.

Method

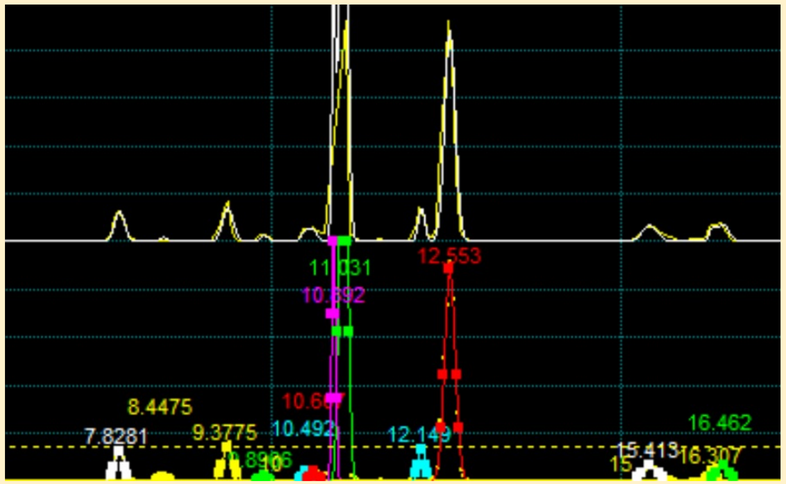
- **Data Collection:** The sample is placed in a gasket between two diamonds. The system are subjected to various pressures and X-ray. Diffraction patterns are obtained at pressures and analyzed.



Diffraction pattern opened in Fit2D software

- After collection, data is opened in Fit2D software where it is 'sliced' into five-degree pieces from 180-360 degrees
- The darker and more concentrated areas produce varying sized peaks

- The slices are exported as chi plots to focus on the location of the peaks
- The location of the peak indicates which mineral and plane are present in the diffraction pattern
- Changes to the peaks at different pressures will often indicate phase changes

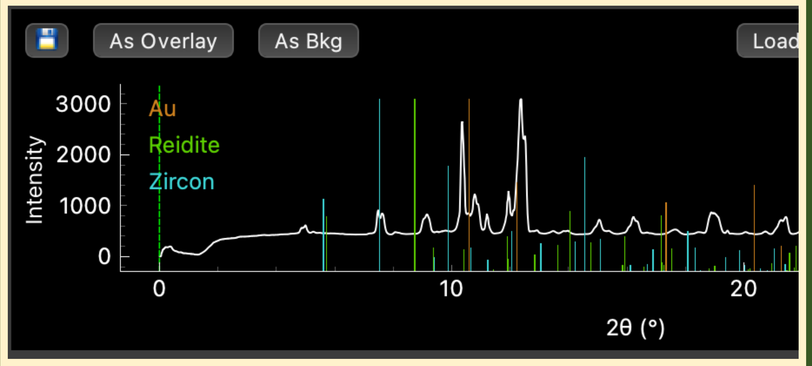


Peak analysis in PeakFit Software

- The PeakFit program allows analysis of the peaks and manual changes to be made for a more accurate fit
- The PeakFit data is exported to excel where it can be categorized for all the slices belonging to an individual pressure step
- The software UnitCell can then take this information to determine the accuracy

Future Research

- Determination of the phase transformation boundary between Zircon and Reidite
  - Reidite found at impact structures can then indicate shock pressure
- Determining which planes are weaker within the minerals and therefore more susceptible to deformation



Phase Peaks identified in Dioptas

References

Morozova, I, "Strength Study of Zircon Under High Pressure" (2015). *Electronic Thesis and Dissertation Repository*. 2907. https://ir.lib.uwo.ca/etd/2907

Morozova, I., Shieh, S. R., Moser, D. E., Barker, I. R., & Hanchar, J. M. (2018). Strength and Deformation of Zircon at Crustal and Mantle Pressures. In Microstructural Geochronology (pp. 167–182). Hoboken, NJ, USA: John Wiley & Sons, Inc. https://doi.org/10.1002/9781119227250.ch7