MS078.O06

When one crystal is not enough

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One of the challenges of high-pressure experiments is the limited accessibility of reciprocal space caused by geometrical limitations. The vises, backing plates, and gaskets used with DACs restrict accessibility to about 30% of the reflections in a triclinic sphere. Especially for lower-symmetry samples, the smaller number of reflections available for structure refinement can reduce the structure quality and require restraints or even constraints.

Recent enhancements in hardware and software design have brought dramatic improvements in data acquisition and data processing quality both for high-pressure and multiple-domain sample experiments, but the accessible reciprocal space largely remains a limiting factor, so far.

This presentation explores a method for increasing the completeness of high-pressure experiments by mounting multiple samples in a Diamond-Anvil Cell (DAC) and measuring and processing data concurrently. Two small olivine crystals were investigated: first independently, and then in a multiple-crystal DAC experiment. These experiments were then compared.

This example, combining specialized techniques for both high-pressure and twins, showcases advances in X-ray hardware and software. Sophisticated tools for data acquisition and processing can make even the most difficult experiments yield superb results.

Keywords: completeness, high-pressure, multiple-crystal method