

MetalJet X-ray sources for experiments at non-ambient pressures

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The interest of exploring new materials at more extreme condition is becoming increasingly important both for fundamental research as well as for application in e.g. superconductors and hydrogen storage. An important tool to characterize and understand these materials is by applying High pressure X-ray diffraction (HPXRD). This application relies on high energy X-rays to capture large part of reciprocal space and to achieve good transmission through the Diamond anvil cell (DAC). In addition, with smaller crystals higher pressures can be achieved at the expense of diffraction intensity. For this reason, more advanced utilization of this technology has so far been exclusive to a rather limited number of synchrotron beam lines. To aid the scientists and to accelerate research we have demonstrated unprecedented high energy beams available for home lab use suitable for high pressure application utilizing the latest high power MetalJet microfocus Xray source. In this case the E1+ using I2 Indium alloy. The X-ray source was coupled to a special high grade Montel optic with slits.

The main beam characteristics were as follows:

- Monochromatic 24 keV X-rays
- Down to 13 μm X-ray spot size
- 2-15 mrad convergence angle (Slit controlled)
- Measured flux of $\sim 1.8 \times 10^7$ ph/sec for 15 μm focal spot

In this communication we demonstrate the setup and provide first glimpse of HPXRD results possible from this unique setup. We will also show how MetalJet X-ray sources were used to perform non-ambient temperature experiments using scattering and diffraction techniques by our users to understand material transformations.

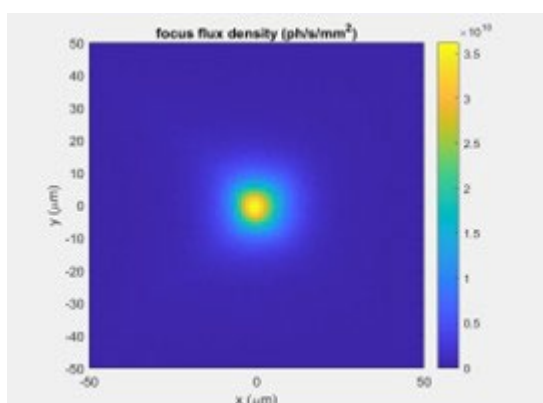


Figure 1