1st Workshop for the Extreme Conditions Beamline at PETRA III



Contribution ID: 23

Type: not specified

Laser-heating and synchrotron measurements

Tuesday 19 May 2009 09:30 (45 minutes)

Previous melting experiments in the laser-heated diamond cell at megabar pressures relied on optical observations of motion or texture. Most of these measurements yielded melting temperatures in good agreement with low-pressure data and with shock melting points obtained at high pressures except for transition metals. In order to understand this discrepancy a systematic study of these elements using X-rays was started. For this purpose, a compact, double-sided laser-heating system for diamond-cell synchrotron applications was built. The pre-aligned optical table, containing laser, spectrometer and all optics for visual observation and measuring temperatures and pressures can be set up at most synchrotron beamlines within about one hour. We carried out measurements on iron, molybdenum and tungsten up to over one megabar and up to over 4000 K at the X-ray diffraction beamline ID 27 at the European Synchrotron Facility (ESRF) and obtained first spectra of molten iron at the X-ray absorption beamline ID 24.

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Session Classification: Dynamic Single Crystal Diffraction at simultaneous high-pressure and - temperatures