SHOCK13-2013-000430

Abstract for an Invited Paper
for the SHOCK13 Meeting of
the American Physical Society

X-ray imaging in the large volume Paris-Edinburgh press

JEAN-PHILIPPE PERRILLAT, Laboratoire de Géologie de Lyon, UMR5276, Université Claude Bernard Lyon1, CNRS and ENS Lyon, France

Synchrotron X-ray tomography is a non-destructive 3D imaging/microanalysis technique selective to a wide range of properties such as density, chemical composition, chemical states, structure, and crystallographic perfection; with extremely high sensitivity and spatial resolution. We describe a new device, based on the V7 Paris-Edinburgh press, to extend this technique to high-pressure high-temperature conditions. It consists of two opposed conical anvils to pressurize the sample encased in an X-ray transparent boron epoxy gasket. Both anvils can rotate, with no limitation in the rotating angles, through two sets of gear reducer and thrust bearings located at the end of each anvil. The accurate and simultaneous rotation of the top and bottom anvils is monitored by stepper motors and encoders. This enables the collection of data at small angular steps over 180° rotation required for a complete 3D tomographic reconstruction. The potentials of this new equipment will be illustrated on two examples: (1) the determination of the volumetric properties of materials by absorption contrast tomography, and (2) the characterisation of ill-ordered materials under HP-HT by X-ray diffraction tomography.