MAX200x: Energy dispersive XRD under extreme conditions

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For geoscientists, material scientists, physicists and chemists it is very important to study the samples under extreme conditions. It is necessary to use in-situ X-ray diffraction experiments at synchrotron beamlines because of the high intensity and the broad energy range to figure out the stability of minerals under high pressure and temperature, the determination of bulk moduli, the thermal expansion, phase diagrams, and the behaviour of kinetic measurements. One of the first apparatus was installed at HASYLAB, MAX80 a single-stage multi-anvil system. This very successful experiment is operated by GFZ Potsdam and is used by more than twenty groups from different countries every year. Today new materials and the use of high brilliant synchrotron sources allow constructing double-stage multi-anvil systems for X-ray diffraction to reach much higher pressures. The newly designed high-flux hard wiggler (HARWI-II) beamline is an ideal X-ray source for this kind of experiments at the MAX200x. The MAX200x is operated in the double-stage compression mode, in which the first stage is the DIA-type apparatus with six anvils and the second stage consists of eight anvils. Either tungsten carbide or cubic boron nitride is used for the second stage anvils. This system has a capability of generating pressures up to 25 GPa and temperatures of 2000° C by a resistance furnace, Lathe et al. (2006).

References

Lathe C, Müller H J, Schilling F R, Reichmann H J, Lauterjung J (2006) HARWI-II: A New High Pressure Beamline Equipped with a Large-Volume Press, MAX200x. Synchrotron Radiation in Natural Science Vol. 5, No 1-2: 111-114

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Abs. No. **34**
Meeting: **DMG 2008**
submitted by: **Lathe, Christian**
email: **christian.lathe@desy.de**
date: **2008-05-29**
Req. presentation: **Poster**
Req. session: **S08**