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X-ray diffraction in single crystals under the influence of temperature gradient

V.R. Kocharyan, S.N. Noreyan

Institute of Apllied Problems of Physics NAS RA, Yerevan, Armenia. E-mail: Vahan2@yandex.ru

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In Bragg condition and Laue geometry specific interest are presented coherent processes in optics of x-ray when external influences are applied to the monocrystal. As an example of such coherent processes may serve total pumping x-rays from the direction of propagation to the reflection direction [1], diffraction focusing and defocusing of x-rays under temperature gradient [2], the phenomenon of transparency of the crystal under influence of ultrasound [3], etc.
The Laue diffraction of narrow collimated (collimation angle ≈3″) polychromatic X-ray radiation in single quartz and KDP crystals under the influence of temperature gradient is studied in present work. It is shown, that the deformation field distribution in the crystal stimulated by the external fields can be determined from the polychromatic beam spectral distribution. Due to the relative layout of diffraction g and temperature gradient B vectors the geometrical focusing B ↑↓ g and defocusing B ↑↑ g of the reflected beams is obtained. A principle of the new type of x-ray spectrometry is considered for which a linear and angular dispersion depends on the magnitude of temperature gradient.

[1] Mkrtchyan A.R., Navasardyan M.A., Mirzoyan B.K. *Pis'ma ZhTF*. 1982. 8. 677.
[2] Mkrtchyan A.R., Navasardyan M.A., Gabrielyan R.G. *Phys. Lett.* 1986. A116, 444.
[3] Mkrtchyan A.R., at all. *Proceedings of International Seminar Conversion Potencial of Armenia and ISTC Programs*, 2000, 1, 150.

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DHS1100 - a new high temperature attachment for 4-circle x-ray goniometers

P. Kotnik[a], P. Hofbauer[a], R. Resel[b], M. Koini[b], T. Haber[b], J. Keckes[c]

[a] Anton Paar GmbH, Graz, Austria, [b] Institute of Solid State Physics, Graz University of Technology, Austria, [c] Erich Schmid Institute and Institute for Metal Physics, University Leoben, Austria

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The new *Domed Hot Stage (DHS 1100)*, a high temperature attachment for temperature-dependent X-ray studies up to 1100°C (1373K) on four-circle goniometers, like texture and stress goniometers, is presented.
The DHS 1100 is designed for measurements of thin plate-like samples with a thickness of less than 2 mm and a maximum lateral size of 25 mm. The samples are clamped by springs to a ceramic heating plate. The temperature of the heating plate is generated by resistive heating. The temperature is monitored by a Pt-10%Rh-Pt thermocouple and controlled by a temperature controller.
The characteristic feature of the DHS 1100 is the dome-shaped X-ray window made of graphite with a thickness of 0.25mm. The dome closes the sample chamber so that experiments can be performed under inert gas or vacuum. To prevent a high thermal load of the DHS 1100, an air cooling system is incorporated. The dome as well as the DHS chassis is cooled by fine air streams. These streams are directed from the chassis of the DHS 1100 towards the dome.
The design of the instrument as well as XRD-relevant specifications, such as the transmission and transmission homogeneity of the graphite dome, its impact on the diffraction data and stability of the sample holder at high temperatures will be discussed.