o.m13.p3 **Holographic light scattering in centrosymmetric crystals**. P. Herth, Th. Woike, *Univ. zu Köln, Institut für Kristallographie, Zülpicherstr. 49b, D-50674 Köln* M. Imlau, *Univ. Osnabrück, Fachbereich Physik, Barbarastr. 7, 49069 Osnabrück* R.A. Rupp, *Univ. Wien, Institut für Experimentalphysik, A-1090 Wien*
Keywords: holographic light scattering, sodium-nitroprusside.

Holographic light scattering in photorefractive non-centrosymmetric crystals is used as an efficient method for the determination of material parameters, e. g. electrooptic or piezoelectric coefficients, and of relaxor-kind phase transitions. During the illumination with a coherent laser beam, the build up of a stray light distribution is observed around the direct transmitted laser beam. Holographic light scattering occurs by the interference of the scattered waves, produced in the crystal, with the pump wave so that it can also be named "one beam holography". In photorefractive materials the resulting interference pattern induces a modulation of the refractive index. The amplitude of such a grating can be amplified by non-linear wave mixing in non-centrosymmetric crystals. However, we have discovered very strong holographic light scattering in the centrosymmetric crystal $Na_2[Fe(CN)_5NO]\cdot 2H_2O$ (Sodiumnitroprusside), in which the amplification by non-linear wave mixing is symmetry-forbidden.[1] The modulation of the refractive index reaches values up to $\Delta n = 4 \cdot 10^{-2}$, which exceeds by about two orders of magnitude the well known doped oxide materials, e. g. $LiNbO_3$, $LiTaO_3$, $BaTiO_3$.[2] In order to get information about the distribution of the gratings in the crystal we have investigated the diffracted intensity by violation of the Bragg condition. After the creation of an intensive scattrered intensity, produced by the illumination of the crystal with the pump wave, the transmitted intensity of the pump beam has been detected during the rotation of the crystal with respect to the incomming beam. Using different wavelengths the diameter of the Ewald sphere is varied and the gratings are detected with different resolutions. Reading the written gratings this way the diffracted intensity is given by the overlap of the Ewald sphere with the gratings. Due to the very high number of written gratings we have determined the amplitude and full width at half maximum of their distribution. In combination with a computer simulation the measured diffracted intensity can be explained on the basis of the Ewald construction.

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o.m13.p4 **Metastable Structures, Bonding Properties and Phase Transitions in Alloys of the Zr-Nb and Ti-V Systems.** G.J. Cuello[*], A. Fernández Guillermet[†], G. Aurelio[†], J. Campo[*]. [*]*Institut Laue Langevin, BP156, F38042 Grenoble, France.* [†]*Consejo Nacional de Investigaciones Científicas y Técnicas, Centro Atómico Bariloche, 8400 Bariloche, Argentina*.
Keywords: phase transition, alloys.

Results are presented of a long-term research project focusing on the structural and bonding properties, as well as the thermodynamic stability of the metastable structures obtained by quenching alloys of the (Zr,Nb) (Ti,V) system, viz., the hcp, bcc and omega phases. The experimental part of the work comprises neutron diffraction studies aimed at a) obtaining information on the composition dependence of the lattice parameters and the internal parameter *z* describing the hexagonal/ trigonal symmetry change in the omega phase of Zr-Nb and Ti-V alloys, and b) performing a study of the site occupancies of the different crystallographic sites in the omega cell. The experiments were carried out mostly at D1B diffractometer at ILL, Grenoble.

With this structural information an analysis is performed of the composition dependence of the atomic volumes, interatomic distances and other structural parameters. In particular, motivated by our previous findings[1] we focus on the composition dependence of the interatomic distances in the Zr-Nb and Ti-V omega phases[2,3] and examine them in the light of Pauling's early correlations for bonding distances in metals[4]. In addition, we present the results of our experimental study about the possibility of atomic ordering in the omega phase, which had been previously suggested by Grad et al.[1] and theoretically discussed by Cuello et al.[5]

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