elements and the cubic materials. This data would be of interest to the solid state Physicists in general and crystallographers in particular.

More data which has not come to the notice of the authors would be welcome for inclusion.

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11.5-1 HIGH-RESOLUTION X-RAY SCATTERING STUDIES OF DEFECT-INDUCED LATTICE DISTORTIONS IN $SrTiO_3$-TYPE PEROVSKITES. By R.J. Nelmes, P.D. Hatton, T.W. Ryan, U.J. Nicholls and H. Vass, Department of Physics, University of Edinburgh, Scotland.

The isomorphous perovskites $SrTiO_3$, $RbCaF_3$ and $KMnF_3$ exhibit the same cubic-to-tetragonal phase transition on cooling through T_c, which is ~100 K for $SrTiO_3$ and ~200 K for the other two. The transition is of the antiferroelectric type. It is almost perfectly second-order in character in $SrTiO_3$, very weakly first-order in $RbCaF_3$ and slightly more so in $KMnF_3$.
We have recently made X-ray scattering measurements of the critical fluctuations in $RbCaF_3$: the results reveal two different length scales above T_c (T.W. Ryan, R.J. Nelmes, R.A. Cowley and A. Gibaud, Phys. Rev. Lett. (1986) 56, 2704). The shorter one is well known: it arises from the usual critical fluctuations and does not diverge at the (first-order) transition. The newly-discovered length scale is much longer, and appears to diverge at T_c. We have suggested that this new feature can be interpreted as arising from large-scale fluctuations into the low-temperature phase (while the sample temperature is above T_c), mediated by the strain energy around defects.
Measurement of the lattice distortion and size of the tetragonal-phase 'clusters' was achieved by determining the displacement and width of the diffraction peaks from the 'clusters' relative to the peaks from the cubic-phase matrix. But the distortion was so small (1 part in 10^4 just above T_c) and the size so large (~2000 Å at T_c + 1 K) that very high reciprocal-space resolution was required. This was achieved by using highly-perfect Si crystals to collimate both the incident and the scattered beams.
Now work on $KMnF_3$ and $SrTiO_3$ has shed new light on the nature of the effect. In particular, we find the cluster size increases in the sequence $KMnF_3 \rightarrow RbCaF_3 \rightarrow SrTiO_3$.

11.5-2 A MONOCHROMATIC BOND METHOD USING SYNCHROTRON RADIATION. By S. Yasuami[1], K. Usuda[1], H. Kawata[2], Y. Higashi[2] and M. Ando[2], 1: R and D Center, Toshiba, Kawasaki 210, Japan, 2: Photon Factory, KEK, Tsukuba, Ibaraki 305, Japan.

A method of absolute lattice parameter measurement, applicable to any single crystals, is under development using monochromatic synchrotron radiation. The system is currently feasible with a few parts of one million in precision in lattice parameter determination. That precision will be good enough to tell, for example, a spatial lattice parameter variation of a GaAs wafer. The system consists of a channel-cut pre energy-selector, a monolithic (+,+) monochromator and a sample axis; the measuring angle region of the 2nd and 3rd axis, which is installed with an encoder of 0.36 arc sec is calibrated by an autocollimator. The whole system is under control of temperature with better than 0.1°C during run. Some applications to characterization of several growth conditions of GaAs crystals will be described in detail.

11.5-3 DIFFUSE NEUTRON SCATTERING ON THE NIOBIUM-DEUTERIUM SYSTEM. By J.C. Osborn and T.J. Hicks, Department of Physics, Monash University, Clayton Vic. Australia.

The low concentration, alpha phase of the niobium-deuterium system is a disordered solution of deuterium in the tetrahedral interstitial sites of the bcc lattice. The displacement field of niobium atoms around a deuterium atom has been studied by diffuse elastic neutron scattering (H. Dosch and J. Peisl, Phys. Rev. Lett., 1986, 56, 1385-1388).
We present diffuse neutron scattering measurements on single crystals containing 2.5 at.% deuterium. Time of flight experiments using polarization analysis showed both elastic and inelastic scattering to be present. The latter was removed by using 4.3 Å neutrons with a beryllium filter behind the sample. Scattering from the deuterium-free crystals has been subtracted. The cross-sections have been compared with a Kanzaki force model of the displacement field.