**13.2-03** NEUTRON SCATTERING STUDIES OF PHONON DISPERSION RELATIONS IN HgTe AND HgSe. By H. Kepa, T. Giebultowicz, University of Warsaw, Warsaw, Poland, and B. Buras, K. Clausen, and B. Lebech, Riso National Laboratory, DK-4000 Roskilde, Denmark.

Neutron scattering studies of the acoustic and optical phonon dispersion relations in the zero-gap semiconductor HgTe in the high symmetry directions 111, 110 and 100 were measured at the DR-3 reactor at Riso using a triple-axis spectrometer. Because of the high absorption cross-section of Hg the measurements were difficult and required for optical phonons about twenty-four hours per phonon and for acoustical phonons about five hours per phonon.

Three versions of the deformable bond approximation (DBA) model of lattice dynamics (Kunc et al. Phys. Stat. Solidi (1975) B71, 341), which includes short-range interactions up to the second nearest neighbour and long-range Coulomb interactions among polarizable and deformable ions, have been fitted to the neutron data. The best and rather good fit was obtained only for the non-central DBA model, in which both first- and second-neighbour interactions are described by tensor coupling parameters in their most general form. The measurements show a degeneracy of the LO and TO branches at the Γ point, which is explained both qualitatively and quantitatively by free-carrier (in the present case-holes) screening of the long-range electric field of LO phonons (Mycielski et al., Phys. Stat. Solidi (1974) B67, 447). On the basis of the model used, the frequency distribution was calculated. Similar measurements on HgSe are under way.

**13.3-01** USE OF NEUTRON SMALL ANGLE SCATTERING IN THE STUDY OF NUCLEATION OF GLASS CERAMICS. By A. F. Wright and B. E. F. Fender, Institut Laue-Langevin, 156X Centre de Tri, 38042 Grenoble, France.

Long term heat treatment near the glass transformation temperature of glass-ceramics leads to a high density of nuclei of very small size. During the early stages of growth and coarsening above Tg, spatial correlation develops among surviving particles which is observed as an interference peak in small angle neutron scattering characteristic of the interparticle spacing. Particle separations covering the range 100Å to > 1000Å are observed as a function of varying nucleation conditions with expected correlation between particle number, density and size. We demonstrate the use of SANS kinetic studies to optimise nucleation treatment and to identify temperature regimes associated respectively with the three main processes of nucleation, growth and ripening. An explanation for the development of spatial correlation among nuclei is presented.

**13.3-02** MULTIPLE NEUTRON REFRACTION BY A SINGLE OR SEVERAL (DIFFERENT) BLOCH WALLS. By R. Seifert, W. Treimer, O. Schärpf and H. Strothmann, TU/FHI, MPG, Berlin; ILL, Grenoble; PTB, Braunschweig.

With the special setup D11 of the ILL (Grenoble), small angle scattering of unpolarized neutrons on a regular magnetic domain structure of a Fe-4at%Si crystal was studied. Position, composition and partial polarization of the well defined and separated refracted beams provided information about the exact arrangement of Bloch walls in the interior of the sample. By systematically modifying the position of the crystal with respect to the incident beam, neutrons which passed by a certain number of walls can be distinguished (due to the zig-zag structure of 90° walls, neutrons may pass a wall several times). Successive refraction by 90°- and 180° walls and single 180° walls were also included. By analyzing the neutron paths through the crystal and the behaviour of the refracted intensities under a certain angle, Bloch wall thicknesses can be determined; we found 80 nm for a <110>-90°-wall.

**13.3-03** PROGRESS IN INVESTIGATION BY SMALL ANGLE NEUTRON SCATTERING OF CREEP DAMAGE IN AISI 304 STAINLESS STEEL. By A.Boeuf°, R.Coppola°, S.Melone+, P.Puliti*, F. Rustichelli°*, E.Turchetti*; °Joint Research Center of European Economic Communities, Ispra Establishement, Physics Division, Ispra, Italy and Institute Laue Langevin, Grenoble, France; + Facoltà di Medicina, Università di Ancona, Italy; * Facoltà di Ingegneria, Università di Ancona, Italy.

Aisi 304 is a stainless steel which is suitable for use in Nuclear Reactor technology and is being investigated togheter with similar materials at Ispra Establishment of European Economic Communities Joint Research Center in order to assess quantitatively the damage induced by creep treatment. In particular Small Angle Neutron Scattering experiments are being carried out at the D11 Facility at the High Flux Reactor of the Institut Langevin, Grenoble. (A.Boeuf, R.Coppola, J.P.Morlevat, F.Rustichelli, D.Wenger, F.Zambonardi J. of Mat. Sci. In print), (A. Boeuf, R.Coppola, F.Rustichelli, F.Zambonardi, S.Melone, S.Maggi, P.Puliti submitted to J. of Appl. Cryst.). This paper reports the last results obtained concerning this research program, and in particular the precipitation of $M_{23}C_6$ carbide for different aging temperature and times and the creep induced microcavities for different temperature and stresses.