its location A from above. The X-ray beam enters by the window C (25 mm high × 4 mm wide) and leaves by the opposite one C'. The window C' has an exit angle $\alpha = 6°$ to allow SAXS intensity determination for a scattering angle range up to 6°. The Ni–Cr heating wires D, passing by small holes in the cell body, are electrically isolated by means of ceramic tubes. The distribution of heating elements, shown in Fig. 2(b), ensures a uniform heating over the sample.

The cell was made of stainless steel because it allows good mechanical precision in construction and fairly good resistance to oxidation at temperatures up to approximately 500°C, without any protection or special atmosphere. Because the cell is essentially cylindrically symetric, the sample remains centred when the temperature is increased.

The maximum diameter of the cell is rather small (35 mm) to allow a reduced axis–bridge distance (Fig. 1). This small O–P distance (20 mm) allows us to determine SAXS intensity at angles as small as 5′.

Thermal isolation is assured by water flow (H–H') in the volume F between the part of the furnace at high temperature and the shaft E [Fig. 2(a)]. In addition, the entrance and exit windows C and C' were covered with a very thin aluminum foil to reduce radiation heating.

The uniformity of temperature along the cell axis was improved adding a supplementary heating coil between the sample and the cooled region to compensate for the heat loss produced by the cooling circuit. In addition, the aluminum foils in the entrance and exit windows help to reduce convection in the cell, and consequently further contribute to the temperature uniformity. The variation of temperature along the cell axis is shown in Fig. 3, where variable x is measured from the top of the cell beam path. Control of temperature over time, during heat treatment, was obtained using an iron–constantan thermocouple G and a conventional proportional controller. The total resistance of the heating coil is about 25 ohm and a current of 2·5 A is required to maintain the sample temperature at 400°C at a water cooling flow of about 0·5 l/min.

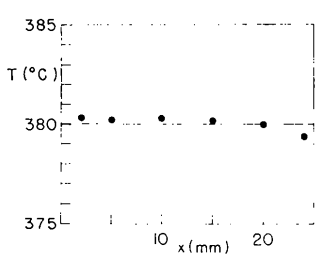

Fig. 3. Temperature uniformity.

For studies of glasses (Craievich, 1974), the cell was used under normal atmosphere. Inert-gas atmosphere can be employed after small modifications in the original design.

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Letter to the Editor

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On the imaging of composition modulations

Sir,

The purpose of this letter is to present some considerations on an interference contrast mechanism for imaging composition modulations in anisotropic crystalline alloys with the electron microscope.

The use of interference contrast is best exemplified by the well known technique of lattice imaging. Fringes are produced by the 'beating' of the transmitted beam against a diffracted beam. The distance between the fringes corresponds to the interplanar spacing of the diffracting planes. In principle, this contrast mechanism can be used to image any periodic structure.

It is well known that an alloy which is undergoing spinodal decomposition has composition modulations along the elastically soft directions (Cahn, 1961, 1962). These modulations in real space produce satellites in reciprocal space. If the modulations exist in the three mutually perpendicular ‹100› directions in real space (as is the case for most cubic alloys), satellites will exist around each lattice spot in reciprocal space along the ‹100› reciprocal-lattice directions. The satellites arise from both strain modulations and structure-factor modulations (Daniel & Lipson, 1943).

The reciprocal-lattice vector $\Delta\mathbf{g}$ which connects a satellite beam to its corresponding matrix reflection is parallel to the direction of the real-space composition modulation which gave rise to it, and the reciprocal value of its magnitude is equal to the wavelength Λ of the modulation in real space. If one satellite is allowed to interfere with its matrix reflection, a fringe pattern should result (modulation images). The fringes would have a spacing of Λ, and be perpendicular to the vector $\Delta\mathbf{g}$. They correspond to the local composition fluctuations that exist in real space.

The fringes should exist when any beam with satellites is used to form an image. However, the intensity of the satellites around the transmitted beam is usually very weak, since they are only formed from structure-factor modulations. Thus, modulation images would be best obtained with a diffracted beam and an associated satellite (*i.e.* dark-field imaging).

The contrast produced by this mechanism would be overlaid on that produced by other mechanisms (*e.g.* structure-factor differences, thickness differences, or strain effects). If the other sources of contrast are too strong, the modulation images will not be distinguishable. However, modulation imaging is a separate contrast mechanism and should be observable in certain crystalline spinodal systems.

Once the fringes are found, it would be necessary definitely to establish their origin. Modulation images can be differentiated from such things as moiré fringes and thickness fringes by showing that the spacing of the fringes is independent of the choice of $\mathbf{g}$. This is so because the satellite spacing is constant. Furthermore, the fringes would have the spacing and direction of the composition modulations, which can be readily ascertained from the diffraction pattern.

Modulation images have not yet been unambiguously observed. The major problem in the alloys studied thus far is that the fringe contrast is too weak, in comparison to the strain contrast

(Laughlin, 1973). Further attempts are presently being made to observe modulation images experimentally.

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Crystallographers

This section is intended to be a series of short paragraphs dealing with the activities of crystallographers, such as their changes of position, promotions, assumption of significant new duties, honours, etc. Items for inclusion, subject to the approval of the Editorial Board, should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).

Dr **Michael Hart** has been elected to serve on the Council of the British Institute of Physics for 1974–75.

Drs **S. Baggio** and Dr **M. Ipohorski** are, respectively, the new Chairman and Secretary of the Argentine National Committee for Crystallography.

Professor **R. Gay** has been elected Chairman of the French National Committee for Crystallography. Professor **P. Muriel** and Professor **R. Weiss** have been elected Vice-Chairmen and Professor **A. Authier** has been re-elected Secretary.

International Union of Crystallography

Acta Crystallographica
Journal of Applied Crystallography

The Executive Committee of the International Union of Crystallography has found it necessary to increase the yearly subscription rates for *Acta Crystallographica* and the *Journal of Applied Crystallography*, as from 1 January 1975. Every effort has been made to keep these increases to a minimum.

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Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).

Diffracted Studies of Real Atoms and Real Crystals

The abstracts of papers presented at the recent International Crystallography Conference held under the above title have been published in a book. The conference, held in Melbourne, Australia, 19–23 August 1974, was sponsored by the International Union of Crystallography and the Australian Academy of Science. Under three topic headings there are over 180 abstracts, totalling