a fine entomology pin with polycyanoacrylate cement and was vacuum coated with aluminium. This gave the crystal a very thin conducting layer which eliminated charging and increased secondary electron emission. The crystal was placed in a two-circle goniometer which was then mounted on a specimen stage of a Cambridge Stereoscan 2A scanning electron microscope. Photomicrographs were taken at five different orientations in order to provide three-dimensional coordinates for all boundary positions defining the various faces of the crystal. These orientations encompassed $(\bar{1}10)$, $(1\bar{1}0)$, (110), $(00\bar{1})$, and (001) faces. Because different magnifications were used for these photographs, it was necessary to place them on a common scale by comparing common features. Overall precision in locating these vertices is estimated at 1·5%.

Once the coordinates for all the vertices of the polyhedral crystal were known, it was possible, when definite faces had been defined, to determine interfacial angles with the crystallographic least-squares lines and planes program of the System XRAY (Stewart, Kruger, Ammon, Dickinson & Hall, 1972). Stereoscopic views of the crystal were drawn using the same data with a model drawing program, *PLUTO* (Motherwell, 1971).

Recent work by Strom (1976) on *Indexing Crystal Faces on SEM Photographs* has prompted us to make this report.

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Turning cylindrical crystals in a common lathe

A steel wire with a face ground by an abrasive wheel can be used as a tool in a common lathe to prepare small cylindrical crystal specimens. The wire, about 0·3 to 0·4 mm in diameter and 35 mm long, illustrated in Fig. 1, is held by a goniometric head mounted in the tool holder. The crystal, glued with hard cement to a rigid stick of wood which will not bend during the ensuing operations, is mounted on a goniometric head which is transferred to the lathe chuck after a given crystal direction is accurately oriented along the intended cylinder axis.

Fig. 1. The lathe tool is prepared from a steel wire by grinding a flat face on it with an abrasive wheel.

By means of two telescopes, one mounted along and the other perpendicular to the axis of the lathe, the operator can observe the approach of the tool with respect to the crystal and thus control the movement of the tool accurately. The details of the operation change for different crystals. In the case of soft organic crystals speeds of rotation of about 200–300 r.p.m. were used. A length of 20 to 30 mm from the fixed end of the wire to the contact with the crystal was found to be convenient for the tool.

The same tool may be used to grind a plane face perpendicular to the crystal axis. As a final operation, a groove carved about the base of the specimen will facilitate later cutting of the crystal.

The specimen is usually left with crystal powder on its surface which has to be cleaned off before use. The whole operation may take about two hours and demands constant and careful attention.

By use of this technique, specimens as small as 0·3 to 0·4 mm in diameter and up to one millimeter in length were prepared. Surface irregularities were about 0·01 mm.

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Meeting Reports

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International Symposium on Order and Disorder in Solids, Paris, 4–8 July 1977

This conference, sponsored by CNRS at L'École Nationale Supérieure de Chimie and organized locally by Professors M. Fayard, R. Collonques and F. Gautier, was the third in recent years on this topic. The first [see *Local Atomic Arrangements Studied by X-ray Diffraction* (1966), New York: Gordon and Breach], held as part of an AIME meeting in Chicago in 1965, was largely concerned with techniques for quantitative measurements of diffuse scattering from alloys (short-range order parameters) and metallic liquids. The second, held in Jülich, Germany in 1974 [see *J. Appl. Cryst.* (1975), **8**, 79–230] was dominated by the outstanding German progress in measuring defect stress fields and defect types in dilute metallic solid solutions and irradiated metals. Some work on non-metallics was reported, as well as some work with the electron microscope.

At this third conference, although there was considerable work presented on quantitative studies, no data on short-range order parameters were given. The presentations were much more balanced, involving extensive use of lattice imaging with the electron microscope, and a very considerable intial effort on non-metallics (oxides, fluorides and carbides).

The meeting was attended by approximately 160 scientists, of whom about 30% were from the USA, Holland, Belgium, England, Germany, Japan, Australia and Canada. Some thirty-eight 45-minute talks, mostly in the form of reviews, were presented in the five days, with two hours each day set aside for lunch in the grand French tradition and two hours for examining the 85 posters that constituted most of the new research presented at the meeting. A hot–humid spell in Paris and this extensive program

made for an arduous but satisfying five days.

Sessions were held in the following areas: electron microscopy of long and short-range order, interstitial compounds, ordering in oxides, ordering and electronic structure, order in 1D and 2D systems, ionic superconductors, theoretical models for ordering and kinetics, spinodal decomposition and critical phenomena, martensitic transformations and pre-transitional phenomena.

There were five main highlights of the sessions:

(1) J. Van Landuyt showed a movie taken in the electron microscope of the phase transformation from β to α phase in silica. The α_1 and α_2 phases are related by rotation of silica tetrahedra (Dauphiné twins) and β can be considered as involving the average of the positions in these two phases. As the transformation starts, or just above it, small regular arrays of domains of α_1 and α_2 appear, oscillate and grow.

(2) Extensive quantitative experimental tests of the theory of continuous transformations were presented by R. Schwahn and W. Schmatz (Jülich), J. De laFond, A. Junqua, J. Mimault and A. Naudon (Poitiers) with Al–Zn alloys, by M. Bronsveld, W. Alsem, E. W. van Royen, J. Vrijen and S. Radelaar (Groningen and Utrecht) with Cu–Ni alloys, and Chen and Cohen (Northwestern University) with ordering systems. The spinodal can be located from the changes in incubation time for small-angle scattering and the shape of the scattering. At long wavelengths, the linear near-neighbor form of the theory appears to be adequate, but at moderate and short wavelengths, terms involving more distant neighbors must be added. Absolute intensity measurements can provide data on the Helmholtz free energy and gradient energy.

(3) Theoretical calculations of the interaction of lattice defects appear to be well on the way to establishing the causes of the extended defects in oxides (C. Catlow, B. Fender and D. G. Maxworthy, Oxford and University College, London). Already good agreement with the large defect arrays observed in wüstite has been obtained.

(4) It appears (at least so far for thin films) that very large modifications of Young's modulus and diffusivity are possible by proper choice of the wave vector of a composition fluctuation (T. Tsakalakos, Rutgers University, and J. E. Hilliard, Northwestern University).

(5) Control of defects and defect arrays in the superionic conductor β alumina is approaching the level of control available in semiconductors. Preparation of the stoichiometric phase was reported and the conducting ions in the layers between the spinel blocks were shown to be locally clustered. Whether these clusters move during conduction must await dynamical studies (R. Comès and co-workers, Orsay).

Studies on ordering and clustering are well under way in many oxides and carbides but in many cases these are in the very early stages, with the structure of ordered phases being determined from spot positions without intensity measurements, and the local atomic arrangements being characterized from a simple analysis of the diffuse scattering. Much remains to be done in these areas. On the other hand, the role of electron–phonon interactions, and the condensation of soft modes to produce charge-density waves and periodic lattice distortions are well in hand. There is thus increased interest in what happens just above first-order transitions to learn about what causes the anharmonic coupling that seems to be controlling many such reactions. This will undoubtedly be a major topic at the next such conference three or four years hence.

The proceedings will be published in a special issue of *Journal de Physique*. As most manuscripts were delivered at the conference this issue should appear early in 1978.

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One Day Symposium on X-ray Diffraction and Spectrometry to Discuss the (UK) Draft Ionising-Radiation Regulations 1978, London, 12 July 1977

The symposium, organized by the Crystallography and Spectroscopy Groups of the Institute of Physics, was very heavily over-subscribed and attendance was closed by the organizers at about 300. In spite of the large numbers the organizers succeeded in coping admirably, and a fruitful day's discussion resulted.

The morning session was opened by Mr P. F. Beaver (Principal Inspector, Health and Safety Executive), who set out the historical background to the present situation. Following the publication of the 1974 Health and Safety at Work *etc.* Act, the Health and Safety Executive was charged with the task of drafting regulations. In effect, Section 1 of the Health and Safety at Work Act says that previous safety regulations should be progressively replaced by new regulations reflecting current thinking, and a system of Regulations and Codes of Practice designed to improve or at least maintain the previous standards of health and safety.

The procedure by which legislation will be enacted is as follows:

(1) An informal dialogue with the users.
(2) The production of a first draft which will, in practice, be written by legal experts.
(3) Agreement of the draft by the Health and Safety Executive.
(4) Agreement of the draft by the Health and Safety Commission.
(5) Formal consultation on the basis of this draft with interested parties.
(6) Agreement of the final form of the legislation by the Health and Safety Commission, the Secretary of State and Parliament.

We are approaching the end of Stage 1.

The relevant earlier regulations, Codes of Practice, *etc.* are enshrined in a number of documents which include the Factories Act 1961, the Ionising Radiations (Sealed Sources) Regulations 1969, the well-known *Notes for Guidance* and, of course, the Health and Safety at Work Act 1974. The new regulations must also embody the provisions of the Euratom Directive.

The dialogue with users has been undertaken by 17 Working Groups, of which the Principal Inspector was Chairman of the Steering Group (Group 1), and of the X-ray Diffraction and Spectrometry Group (Group 12). The draft for discussion produced by Working Group 12 was provided for each participant. Since the Bristol conference and during the life of these Working Groups the Health and Safety Executive's philosophy has changed quite markedly.

The draft was discussed in detail by the second speaker, Mr E. G. Weatherley (Health and Safety Executive). He emphasized the terms of reference under which the Health and Safety Executive were working: that the standards should not be lower or less comprehensive in any respect than those set by existing Codes; that the regulations must be homogeneous in application so that they apply equally to all places of work. He also made it clear that the Health and