

## Conclusion

Incommensurate crystal phases show a wealth of detail which are, however, not always easy to disentangle. From the physical point of view, the causes of the stability of these phases are more or less understood, although there are still many questions outstanding, partially of a technical, but also of a fundamental nature. For small deviations from normal periodicity, perturbative schemes are useful, but in general, the non-linear effects are too big for such approximations to be applicable. The better approach would seem to lie in an extension of the usual solid state theory in a way that makes use of the crystallographic super-space symmetry group. One has then, of course, to interpret the results obtained in terms of the physics in three-dimensional real space.

## LITERATURE

To facilitate access to the current literature a (fairly arbitrary) choice of papers is given, where further references can be found. Refs. 1-11 concern specific materials, 12-14 symmetry and 15-21 theoretical considerations.

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## Surface Science

The Belgian city of Ghent was host to the fifth European Conference on Surface Science: ECOSS from 24-27 August. This year's meeting, the local organisation of which was co-ordinated by the Rijksuniversiteit Ghent, followed its predecessors in maintaining a single oral session during the day with evenings devoted to poster presentations. Held in the Ghent International Congress Centre, a convivial atmosphere was assured by the close proximity of the auditorium, poster exhibition and coffee bar. The conference was accompanied by an industrial exhibition that covered a broad range of equipment from a complete ESCA photoelectron spectrometer to individual vacuum components, specimen manipulators, UHV pumps and residual gas analysers.

The ECOSS meetings have become established as the primary European forum in the field and as such attract a wide range of participants from outside as well as inside Europe. At these meetings the majority of papers are concerned with experimental studies of the phenomena occurring at single crystal surfaces. Nevertheless, there was also a wide range of other contributions: applied topics like the spectroscopy of helium microbubbles in metals and also fundamental theoretical work such as calculations of the electronic component involved in damping relative motion during the interaction of atoms and molecules at free electron surfaces.

The programme reflected the increased involvement of workers in problems of co-adsorption, surface reactions and prototype catalytic systems. Semiconductor surfaces and metal-semiconductor heterostructures were considered in detail as was the problem of surface segregation in binary alloys. Groups using established spectroscopic techniques like low energy electron diffraction have been producing

convincing evidence for multiple layer relaxation at clean metal surfaces and have made structural determinations of some complicated adsorbate layers. Many papers were concerned with the electronic properties of various overlayer structures in which the principal tool is ultra-violet photoelectron spectroscopy. The importance of polarization measurements and considerations of adsorbate symmetry were clearly emphasised. At high photon energies, the availability of synchrotron radiation has led to a vigorous programme of study into surface core-level shifts and their interpretation. One morning was devoted to the new and rapidly expanding field of molecular-beam scattering from surfaces with talks on both high resolution inelastic scattering and accounts of studies into the nature of the interaction potential between helium atoms and surfaces.

Perhaps the most interesting and unusual presentation of the conference was the description of the new type of surface microscopy in which a current of electrons tunnelling between the sample under investigation and a sharp tip held in close proximity to it gives a direct microscopic image of the surface.

Not surprisingly, in a field where so many experimental techniques can be brought to bear on a particular problem, there are a number of simple systems where a conflict of evidence arises; oxygen adsorption on nickel is only one example of many. Paradoxically, as the various techniques are refined, the number of disparities appears to be on the increase but this is merely to say that our present understanding leaves much to be desired and a great deal remains to be revealed at future meetings in this series.

W. Allison



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