Editorial

What's new in electron microscopy ? An optician's view

The twelfth international congress on electron microscopy, ICEM XII, generated four stout proceedings volumes, entitled imaging, analytical, biological and materials sciences, respectively. However much we may criticize huge meetings with numerous parallel sessions, anything really new is likely to appear in an ICEM or a EUREM meeting: what did ICEM XII presage for electron microscopists ? In the imaging sciences volume, the editors offer us their answer by labelling two of the sections "Revolutionary Developments in EM Instrumentation" and "Novel Method [Sic] of Analysis in 2D and 3D Microscopy: Classification and Restoration". In the first of these, by far the most exciting papers are on electron holography: the groups led by Tonomura (Hitachi), Lichte (Tübingen University) and Hanszen (PTB, now retired) have been dazzling us with their wizardry for some years now but at last, genuine holographic electron imagery is in sight. This really is likely to change attitudes to high-resolution microscopy in a few years. Of the papers on aberration correction, that of Rose on sextupoles and Wien filters and those by Crewe and a Chinese group on sextupoles confirm that these multipoles are the present favorites; a rather traditional paper (Rempfer) on mirror correction seemed less hopeful. This first section ends with an extremely ingenious attempt to give the STEM "a potential resolution of 0.0015 nm, which is around $\lambda/2$ for 120 kV electrons..."; the author, J.T. Fouric, also describes a promising experimental result.

The other novelty section, on classification and restoration, beings us up to date with the work of Frank (Albany) and Van Heel (Berlin), pioneers in the manipulation of large data sets of poor quality in electron microscopy. Members of the SFME also appear here, with papers by Bonnet and colleagues (Reims) and by Trebbia (Orsay) on various uses of factorial analysis.

Elsewhere the advances are more predictable: computer-aid almost ubiquitous; dynamic studies ever faster (not just from Bostanjoglo, Berlin but a 200 MHz pixel-rate SEM from Kachina Technologies, appropriately enough situated in New Mexico); increasing understanding inevitably accompanied by increasing complexity in the section on high-resolution.

In the volume on analysis, the editors have been less helpful: apart from "Advances in Analytical Instrumentation", they leave us to unearth the nuggets. I noticed the use of a Wien filter for EELS (Tsuno, JEOL), lots of neat ideas in CBED, but the highlights in this volume will depend on the reader's particular tastes.

Volume 4, on materials sciences, contains about as many pages as volumes 1 and 2 together

("Materials Rule OK"). It is organized by specimen nature but does contains a section on "Novel Characterization Techniques". This should really have been entitled "Recent..." rather than "Novel...", for only Borchert's deliberate use of specimen charging to create SEM contrast seemed original.

What, then, was truly new, or at least in rapid growth, at Seattle, to judge from the proceedings ? My impression is that after a period of retrenchment, very high resolution electron microscopy is once again in a very exciting stage of development with computer image processing tools being integrated more and more intimately into a microscope-computer ensemble. Analytical electron microscopy has now become a regular feature of the microlandscape and is no longer to be commented on as a new arrival. And finally, the attempt made many years ago to keep these meetings manageable by excluding routine applications of the microscope has clearly been abandoned. A glance at these does however show that research microscopists looking for a field that is not yet overcrowded might consider studying diamonds: only two papers in that section but perhaps the cost of specimens is a deterrent.

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Note: The proceedings of ICEM XII are available from the San Fransisco Press, Box 6800, San Francisco CA 94101-6800, U.S.A.