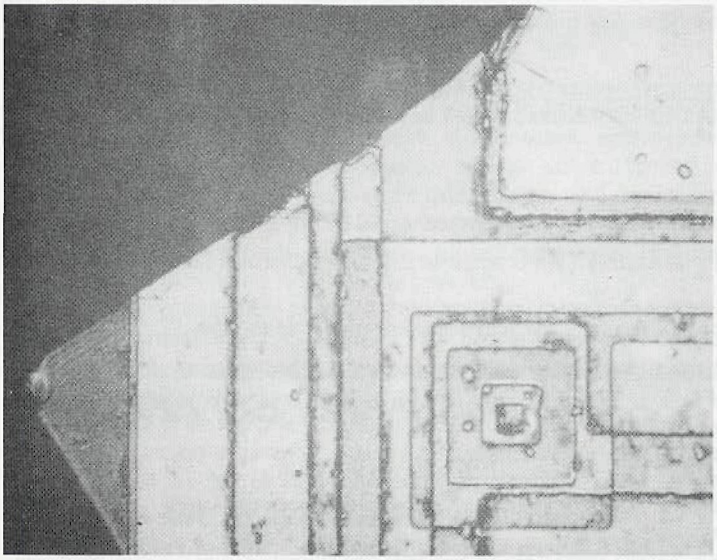

Figure 3: Acoustical image of silicon wafer chip taken at 1 GHz.

SOIL TECHNOLOGY, A COMING FIELD AND A NEW MICROSCOPY TO SUPPORT IT

Sterling P. Newberry, Consultant

A quiet report from an international work shop, this fall in London on World Ecology, points out how primitive our knowledge of basic soil science really is (1). It also records the determination of the participants to bring out the need to study soil in relation to maintaining biodiversity because of man's rapid destruction of global habitat and the inability for soil to recover without it's natural canopy of plant and animal life. It is further pointed out that we have to quickly learn how to reclaim soil, perhaps by artificial means, after insult. The programs they envision will create exciting professional opportunities both for career change and for students over a broad spectrum from basic research to applied engineering. The land fill crises has further underscored the need to find ways to return sewage sludge and other organic waste to useful crop production.

X-Ray Microscopy in the ultra soft region has recently been shown to be an ideal tool for studying the complex structure and chemistry of soils (2). This paper by Thieme et. al. at our New Orleans meeting, employed x-ray microscopy from a Synchrotron light source. By fine tuning of the wavelength employed, they were able to demonstrate spectroscopically differentiated images of soil components including organic materials in colloidal suspension. They also demonstrated direct measurement of clay mineral pore geometry and volume for the first time. One of the surprising results was that the washing of sludge with detergents binds heavy metals into the soil rather than removing them as expected. Then the vegetables and/or stock feed later extracted the mercury, cadmium etc. for delivery to our tables via our food chain. As the authors point out, the combined resolution and penetration of the soft x- rays cannot be matched by either the optical or electron microscopes in the native, aqueous, living state so necessary for studying soil systems. We look forward to seeing a full publication of this work, since they reported much more than the material given in the extended abstract. ■

1. Peter Aldhous, Ecologists Draft Plan to Dig in the Dirt, Science 265:1521, September 9, (1994).
2. J. Thieme, J. Niemeyer, P. Guttmann, Colloidal Systems in Soils, MSA Proceedings (1994), p. 64-65.

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Tricks of the Trade

SAMPLE PREP FOR POWDERS

A powder in aqueous solution can be added dropwise to a culture tube containing methanol. The culture tube is in a rack inside an ultrasonic bath to disperse the particles. After a minute or two, the solution can be dropped onto a SEM stub or a TEM grid using an eye dropper or capillary tube open at both ends. I like to use a polished SEM stub because it has a smooth surface and makes it easier to see the particles. If you are using a TEM grid, place the grid on top on 2 sheets of lens tissue before dropping the dispersion on to the grid; this will quickly wick away the solvent and keep the particles reasonably dispersed.

You can try other solvents (like hexane) but they may not be compatible with water (the particles tend to flocculate). Methanol or Ethanol usually work better in an aqueous solution.

The main idea is to disperse the particles ultrasonically, then use a volatile solvent which will evaporate quickly before the particles have a chance to reaggiomerate.

Jim Stets, Air Products and Chemicals, Inc.

New Book Review

BIOLOGICAL MICROTECHNIQUE

J.B. Sanderson, Sir William Dunn School of Pathology, Oxford

Number 28 of the Royal Microscopical Society Handbooks, *'Biological Technique'* is, as we have come to expect from this august body, a veritable mine of information, bang up to date in its methodology. Being considerably larger in pagination than the others in the same series, it covers very well the basics of classical methods of microtomy, including knife sharpening and potential faults. As well as the classical, are up to the minute techniques of microwaving, paraffin and cryostat sections. Arranged in seven chapters viz:

1. *Introduction.* Collection of material; choice of preparative technique and looking at preparations
2. *Fixation.* From function and use of fixatives to microwaves in histology and much more.
3. *Tissue Processing.* Starting with dehydration and proceeding through all the more normal techniques but including newer techniques using Polyethylene Glycol Waxes, Epoxy Resins and Acrylic Resins. With notes on lignified tissues, insect tissues, hair, fibres, diatomes, etc.
4. *Microtomy.* Detailing types and uses of microtomes, knife types, bevels and facets, angles, sharpening. Wax structure, sectioning technique, and difficulties.
5. *Other Preparative Techniques.* Covering cytological methods, smears, imprints and replicas; to whole mounts, dry mounts and glycerol jelly mounts.
6. *Staining and Dyeing.* 28 pages of various techniques and the actions of stains and mordants, nuclear stains, counterstains, with the methodology of their use and the whys! Staining of bacteria, removal of pigments, etc.
7. *Finishing the Preparation.* From water based to resinous media, coverglass thickness, cleaning of slides and fading of specimens. It is all covered. Also a little section on the restoration of damaged slides which is most interesting.

There are appendices which cover safety and refractive indices. All the chapters are completed with a wealth of references and a wealth of halftone and line illustrations plus tables complete a most useful textbook. Mr. Sanderson is to be congratulated on a well planned and well executed handbook.

Price $40.00 (includes shipping and handling). Available from *Microscopy Today* with payment by check, purchase order or Visa/Mastercard.