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CAMBRIDGE SOCIETY FOR THE APPLICATION OF RESEARCH

"Naked!!"

The environmental scanning electron microscope

Dr Debbie Stokes
Cavendish Laboratory

Monday 29nd April, 2002: ***7.30 p.m. - 9.00 p.m.***[1]
The Wolfson Lecture Theatre, Churchill College, Cambridge

Dr Debbie Stokes writes:

Although many specimens can be viewed by scanning electron microscopy (SEM), they must often undergo preparation to render them in a dry or solid state (dehydration or freezing) & given a conductive coating. These precautions are necessary to avoid spoiling the high vacuum of the SEM column and to dissipate negative charge deposited by the incoming electron beam. Not only are such preparations tedious, time-consuming & often an art in themselves, they carry the risk of introducing artefacts or obscuring fine details. Imaging of truly 'naked' specimens by SEM has, therefore, traditionally been restricted to dry, electrically conductive substances, such as metals, that are naturally suited to electron irradiation under high vacuum conditions.

Or, at least, that was how the story went. Environmental scanning electron microscopy (ESEM) has changed all that. This instrument has several unique features that make it possible to look at just about any specimen 'naked', without all that conventional preparation. The range of potential specimens and opportunities for new *in situ* dynamic experiments is clearly enormous, especially for 'wet, soft & squishy' materials. This lecture aims to explain some of the fundamentals of ESEM while revealing just how far we can go. For example, a few years ago it would have been preposterous to think of putting an entirely *liquid* specimen into an electron microscope, yet this is now possible using ESEM. We will look at a number of naked specimens, from organisms & human cells to oil droplets & polymer spheres suspended in water.

About the Speaker

Dr Stokes works at the Cavendish Laboratory, where our President, Sir Sam Edwards, was the former Director. She is in the Polymers and Colloids Group, and for the last three years she has been the Royal Society Dorothy Hodgkin Research Fellow. She was also a research technician in the Chemistry department at Bristol for a while

She holds a First in Chemistry and Physics from the Open University, and completed her PhD at the Cavendish under Professor Athene Donald on the use of the scanning electron microscope for studying food.

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[1]**Note:** We have now decided to **KEEP** the **earlier** start time of **7.30 p.m.**; Thanks to all who voted, and sorry to those who wanted to revert to the later time – we hope you will continue to support us, nevertheless

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Her excellence in inventing new techniques and methods in microscopy has been recognised by several awards.

These include the 1998 Castaing Award for the Best Student Paper at Microscopy & Microanalysis '98; First prize at the 1998 Micrograph Competition at Microscopy & Microanalysis '98, presented by the Microscopy Society of America (MSA), an award for her poster at the Microscopy & Microanalysis '98, presented by the Microscopy Society of America (MSA), and winning a SET for Britain, Highlights of Physics '99, British Aerospace Prize in 1999.

About the Subject *(Organising Secretary's notes)*

I have a great love of microscopy; after all, it paid my living for many years, when I was an industrial microbiologist and during my PhD. I used light microscopy, however, although recently I was able to solve a thorny problem in emulsion science by engaging the services of the Ultrastructure Department at my old laboratory, the John Innes Centre in Norwich. If I had known about Debbie's work, I would certainly not have gone any further than the Cavendish!

I too trained as a technician before going to University; a good background, and some of the most enjoyable times I have ever had in a laboratory!

Debbie Stokes comes to us highly recommended; should be another excellent evening!

Richard Freeman
Organising Secretary

HOUSKEEPING NOTE

This term's lectures are all over the place – so be warned

The remaining two lectures will be

The Large Hadron Collider at CERN (and other particle colliders)

Professor Chris Llewellyn Smith, Provost of the University of London

May 20th (ages away)

Then

The World, as seen by Insects

Professor Simon Laughlin, Department of Zoology, University of Cambridge

June 10th (also ages away)

Sorry about this, but Queen's birthdays, Bank Holidays and the like have shot our normal programme for Easter Term to ribbons; next year's Easter Term doesn't look much better.

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Richard

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