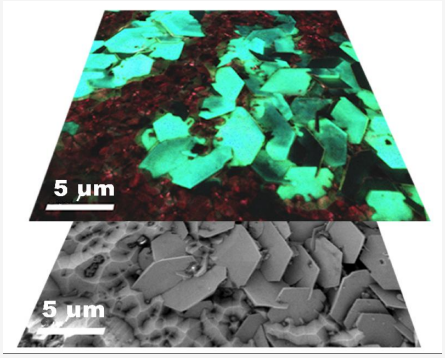
JEOLink

JEOL USA SEM & TEM News

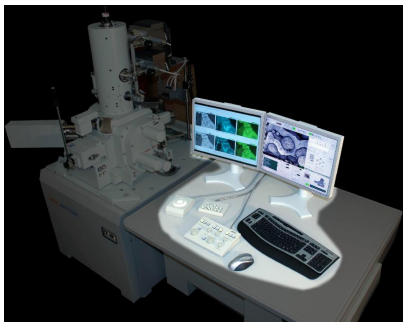
July 2009

Extreme Image



Aluminum Gallium Nitride SEM image overlaid with ChromaCL image. Performed with JEOL JSM-7600F Analytical Thermal FE SEM.

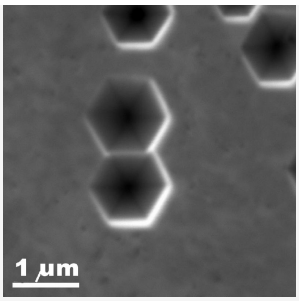
Remote Demo from Semicon West Showcases Analytical Thermal FE SEM

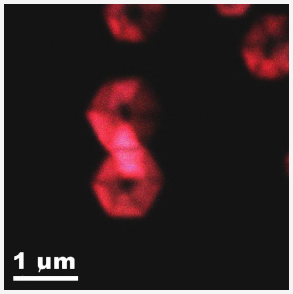


Semicon West (July 14-16) is where the trade show action takes us early this month, and from the show floor in our booth #606, we will provide remote demonstrations of the new JSM-7600F analytical FE SEM with full analytical capability. This high performance SEM offers ultrahigh imaging resolution at up to 1,000,000X magnification, and X-ray analytical mapping of individual layers, elemental composition, contaminants, particulates, and process defects in semiconductor devices.

The only fully-analytical field emission SEM to feature a large chamber with large specimen exchange airlock and LN2 anti-contaminator continued >>

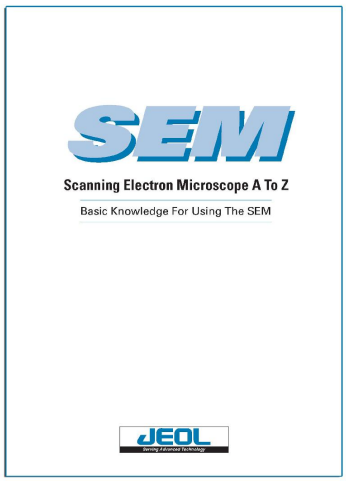
Fault Site Localization Technique by Imaging with Nanoprobes

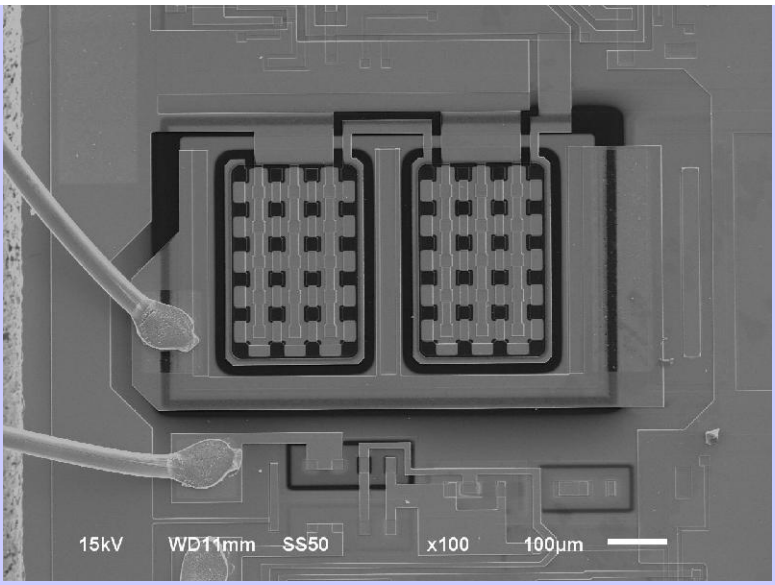




SEM 101: Two New Publications Available

JEOL's popular introduction to SEM books have been updated and we are pleased to offer you two new pamphlets on the SEM. Click on each image to access.





Recent implementation of nanoprobing overcomes limitation of EBIC detection in VLSI circuits. A new paper printed in Electronic Device Failure Analysis (May 2009) - authors Takeshi Nokuo (JEOL) and Hitoshi Furuya (Fujitsu Microelectronics) -describes nanoprobing with the SEM.

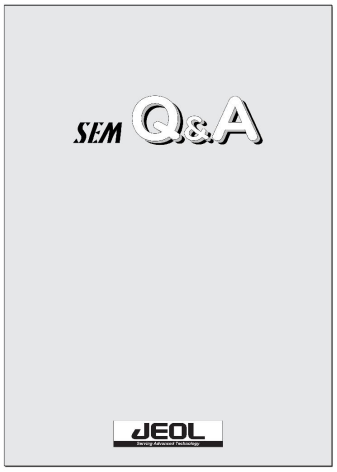
Introduction

In the semiconductor industry, progress in failure analysis (FA) is indispensable for improving the productivity of devices. However, recent aggressive downsizing of devices with multilayer structures complicates and diversifies failure modes, making FA extremely difficult. Engineers engaged in FA spend much more time in localizing fault sites; even worse, they are faced with cases where fault site localization is impossible. Therefore, to improve FA yield, which reveals the physical root cause of a faulty device and feeds it back to the process line, it is essential to implement new defect localization techniques that keep up with new technology development.

Nanoprobing techniques have been developed to meet these demands. The nanoprobing method with a scanning electron microscope (SEM) achieves higher spatial resolution than the former probing method with an optical microscope. This new method facilitates fault site localization down to an individual transistor level, which cannot be achieved by the former method. **Read the full paper > >**

The Ultimate in Contrast:

JEM-2200FS TEM with Phase Plate



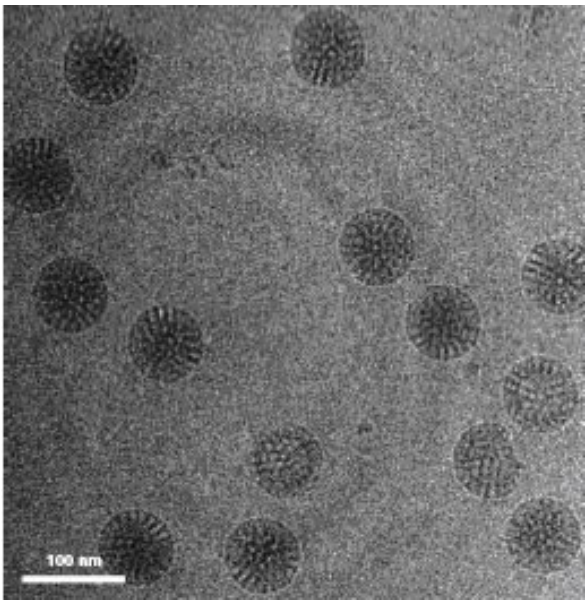
JEOL USA in the News

Development of a 200kV Atomic Resolution Analytical Electron Microscope - *Microscopy Today* May 2009

How to Map Neural Circuits with an Electron Microscope

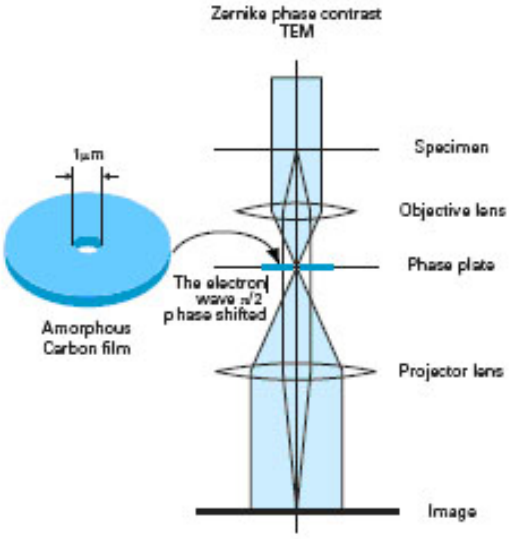
Ask us about our award-winning Service and Support

Unmatched in the industry!



All biological microscopists face tradeoffs in the attempt to increase contrast in their specimens. Carbon-based life forms are composed mainly of light elements, making specimens essentially transparent in the electron microscope. Heavy metal salts are traditionally added for positive staining of fixed and embedded specimens and negative staining of whole structures deposited on a support film. When the electron beam interacts with the nuclei of the heavy metals, many electrons are deflected at a wide angle and do not enter the imaging lenses. This fractional removal of signal is responsible for the image grayscale displayed on the fluorescent screen and captured on a digital camera. This contrast mechanism, which is dependent on elastic scattering and subtraction of electrons, is called amplitude contrast.

But a second contrast mechanism contributes to the physical basis of contrast. Some electrons in the electron beam are deflected at low angles, lose some energy but still enter the imaging lenses. These inelastically scattered electrons have a shorter focal length than the unscattered beam electrons and give rise to phase contrast, which appears as a light halo around the biological object. Phase contrast light microscopy has long been an indispensible tool for live-cell imaging. As shown more than 60 years ago by Zernike, the insertion of a phase plate in the diffraction plane of the light microscope generates high contrast images. This effective technique has only recently been successfully applied to TEM. **Read the full article>>**



Upcoming Meetings & Tradeshows

Semicon West

San Francisco, CA

July 14-16

Booths #606 and 1106

Microscopy & Microanalysis

Richmond, VA

July 27-30

Booth #208

XVIII International Materials Research Congress 2009

Cancún, Mexico

August 16-21

SPIE/BACUS Symposium

Monterey, CA

September 14-18

Quick Links

JEOL News Magazine

July 2008 - Volume 43 (Note: requires online registration to download).

Energy Table for EDS Analysis

JEOL USA Online

Products

Resources

Documents and Downloads

Making Plans for M&M?

The microscopy community heads to Richmond, Virginia this summer (July 27-30) for the Microscopy & Microanalysis 2009 Conference and the annual meeting of the Microscopy Society of America. (Image right is Focused Ion Beam image of M&M logo).

We're excited about four workshops and tutorials we will be presenting in our booth #208.

- **Dual-Axis Tomography, Nuts & Bolts - Monday, 5:30-7:30 p.m.**
- **Introducing the ClairScope: Atmospheric Scanning Electron Microscope and its Applications - Tuesday, 5:15 p.m.**
- **MultiBeam EDS Capabilities Lunch & Learn Workshop(Presented by EDAX and JEOL) - Wednesday 12:00 - 1:00 p.m.**
- **Nano-manipulation in FIB (Omniprobe and JEOL)- Wednesday 3:00 - 4:00 p.m.**

If you would like to join us, please contact your local JEOL sales representative or contact JEOLink to rsvp.

We are demonstrating several products each day throughout the conference. Please contact your local JEOL sales representative to schedule a demonstration of the following instruments:

- **JSM-6610LV Low Vacuum Analytical SEM**
- **JSM-7600F Thermal Field Emission Analytical SEM**

- **MultiBeam Focused Ion Beam System**
- **JEM-1400 Automated Bio-TEM**
- **Ion Beam Cross Section Polisher**
- **Hyperprobe EPMA System**
- **NeoScope Benchtop SEM**

FIB image of M&M logo courtesy of Boston College

SEM/TEM Image Gallery

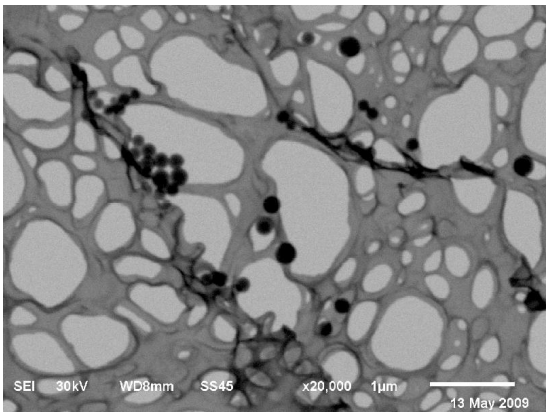
Cross Section Image Gallery

Tomography

Past Issues

Contact Us

Low Cost STEM using SEM



STEM image of polymer micelles

STEM (Scanning Transmission Electron Microscope) imaging is used to view the internal structure of thin (100-200 nm) specimens.

As particles distributed on a substrate become smaller and smaller, the Secondary Electron contrast of these features becomes very low. The nondescript, translucent contrast from the bulk material below the surface competes with the desired surface shape contrast more and more as the particles become smaller and smaller. The resulting surface contrast is greatly reduced.

If these particles are in the submicron to nanometer size range, and if the size and shape information of the particles is of primary importance, then STEM may offer an alternative with better contrast. If the particles can be mounted on a thin film, there is no subsurface interaction. They can then be viewed with more contrast and sharpness. The size and shape of particles can be more easily defined in the STEM mode.

A full featured STEM Detector/Amplifier accessory is usually available for each model of SEM. These accessories have a moderate cost, especially when compared to a full TEM/STEM instrument.

However, a low cost way to view STEM contrast in an SEM is by the 'STEM Conversion' method. relatively inexpensively with a STEM Conversion Holder. **Read the full article>>>**