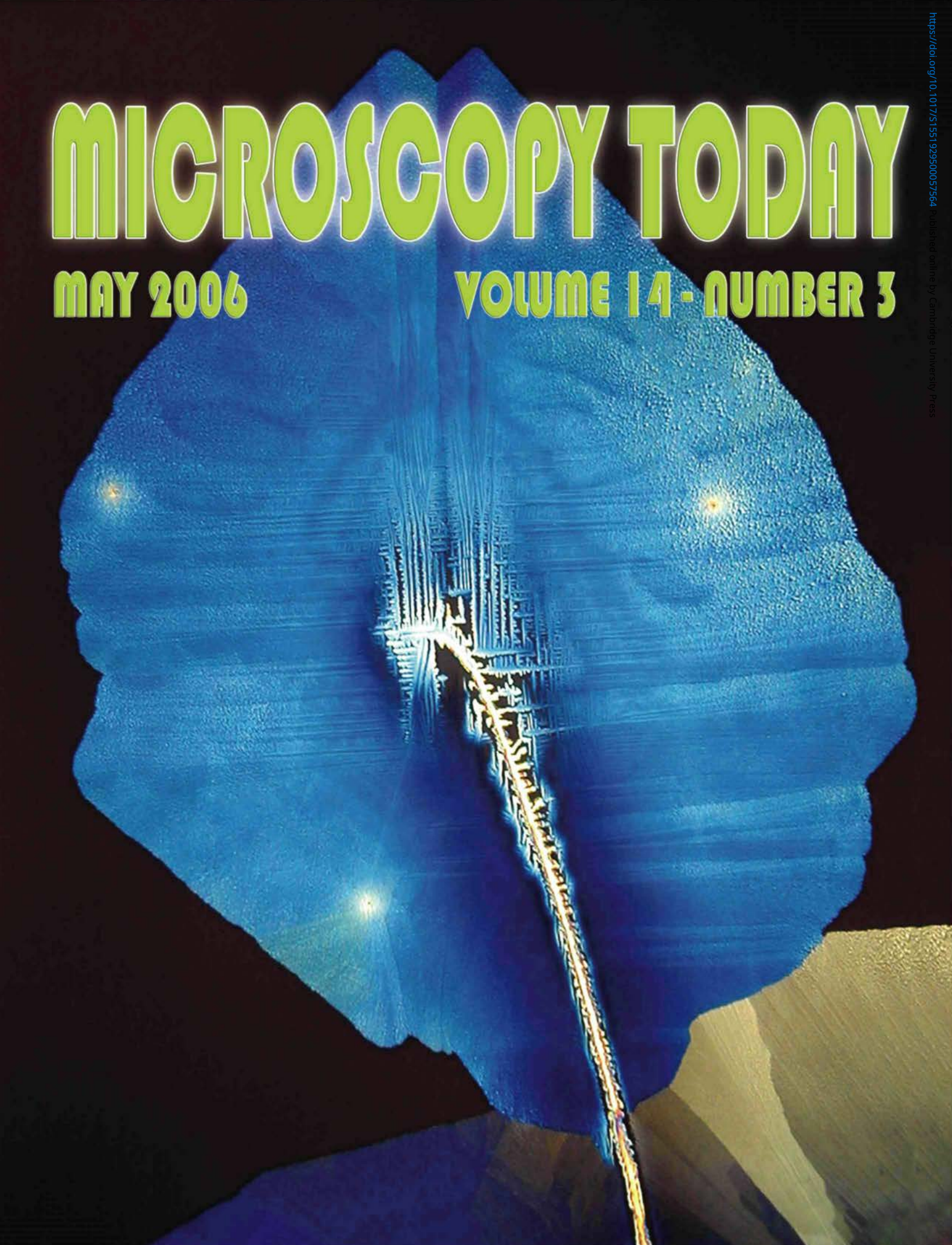
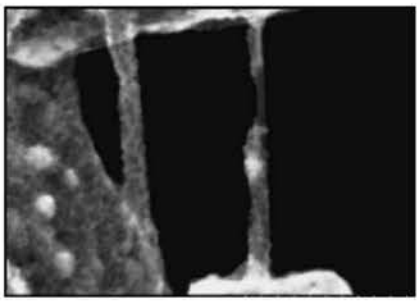
# MICROSCOPY TODAY

MAY 2006 VOLUME 14 - NUMBER 3



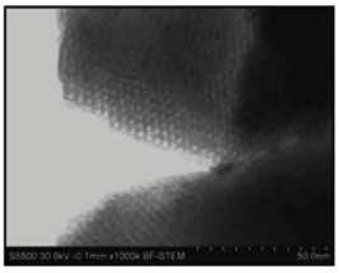
# The Ultimate in Resolution.



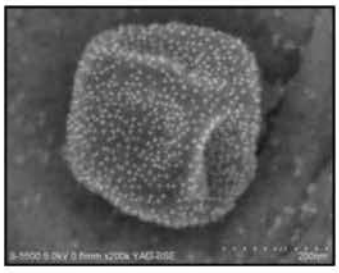
X1000k, 30.0kV Single Walled Nanotube

## Hitachi S-5500

In-lens Field Emission Scanning Electron Microscope



X1000k, 30.0kV Mesoporous Silica



X200k, 5.0kV Immuno Labeling

The Hitachi S-5500 is a dedicated ultra-high resolution In-lens FE-SEM for leading edge research and development of nanotechnologies.

The patented in-lens technology provides the ultimate performance of 0.5nm guaranteed imaging resolution.

The S-5500 is equipped with a shielding system for reduced EMI and acoustic interferences. These improvements with a completely dry vacuum system ensures Hitachi's high-resolution guarantee for the life of the instrument.

A newly designed BF/DF Duo-STEM detector (patent pending) contains an adjustable dark field detector for tunable collection angles.

Sometimes a single image can change the way we look at life. The new S-5500 with its advances in information collection will lead you to those opportunities.

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Inspire the Next

# Teaching Old Microscopes New Tricks

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There are many transmission electron microscopes (TEMs) that have provided years of reliable service and good images, but they lack the positioning systems that are standard on the newest microscopes. A precise digital positioning capability is essential for many quantitative stereological studies and relocating specific features on a grid. For many of the older TEMs, retrofitting them with a digital positioning system is not an option, or at least a very expensive upgrade. Now Martin Hohmann-Marriott, William Sharp, Robert Roberson, and Robert Blankenship have described the hardware and software that offer a second life to these older microscopes.[2.]

The readily-available hardware can be purchased at a local electronics store, or mostly they can be scavenged from the computer mouse that plugs into the serial port. A pair of optical wheels with readouts are physically interfaced with the mechanical translators (*x* and *y* stage cranks) on the microscope and in turn hooked up to a simple computer, such as a laptop. This hardware costs about $50, plus the computer. The programs were written in the Perl computer language that is freely available at http://www.activestate.com/Products/ActivePerl/ to work with Windows. The programs should be available at the Microscopy Research and Technique web site at http://www.interscience.wiley.com/jpages/1059-910X/supplmat as supplementary materials.

Hohmann-Marriott *et al.* describe in detail how this hardware and software are integrated to create a digital positioning system. This includes hardware assembly, communication format, computer system requirements, the software environment, distance calibration, digital realignment, and position determination. They demonstrate how the system worked on two Philips microscopes, finding that the determined position deviation was about one micron or less in the *x* and *y* axes. After reloading and computational realignment, the determined position variation was less than three microns. This may not be as good as a new top-of-the-line microscope, but it clearly will make an older microscope much more useful.

This article clearly demonstrates a workable solution for upgrading TEMs with mechanically-driven stages. As Hohmann-Marriott *et al.* point out, this affordable system delivers the spatial resolution and position fidelity suitable for electron microscopic study of biologic specimens. This would be particularly practical in an electron microscopy suite where excellent older microscopes are underused and the newer microscopes with factory-installed positioning systems overbooked. Finally, this "home made" positioning system is very flexible and may be transferred to other instruments, including light microscopes, dissecting microscopes, and positioning tables.

Hohmann-Marriott *et al.* have shown that old microscopes can perform new tricks! ■

1. The author gratefully acknowledges Dr. Martin Hohmann-Marriott for reviewing this article.

2. Hohmann-Marriott, M.F., W.P. Sharp, R.W. Roberson, and R.E. Blankenship, Digital position determination system for electron microscopy, Microscopy Research and Technique 67:106-111, 2005.

## INDEX OF ARTICLES



## ABOUT THE COVER

The May front cover is a crystal formed by the influence of a drop of "Cherry" wine. This and over 100 other images were captured using the actual 1930's test samples from one of the top (now deceased) bootleggers of the prohibition era – who, the story goes, supplied the infamous Al Capone syndicate. The samples included "really informative names" such as "Batch 105," "Batch 76, "Cherry," *etc*, creating images now part of the "Vicarious Bootleggers Collection," by T. H. Saunders. Images were captured using cross polarization, transmitted light with a Zeiss Axiophot and 10x/0,30 Zeiss Epiplan-NEOFLUAR HD-DIC on 35mm Fuji Realla 100 negative film. Only minimal Photoshop contrast enhancement was applied. This and other Saunders Collections images will be on display and sale at the July M&M 2006 meeting in Chicago – all net proceeds benefitting the MSA Undergraduate Scholarship Fund.