# New Light Microscope for Nano Imaging!

**By Peter Walker**

Ever since the German physicist Ernst Abbe determined that light microscopes cannot resolve objects smaller than half the wavelength of visible light (about 300nm), this has been seen as an unbroken, perhaps even unbreakable law of physics.

A German engineer, Kurt Olbrich, has invented an optical light microscope capable of resolving <100nm using reflected and <250nm with transmitted light. The Olbrich Lens System (OLS) has been developed, refined and produced over a period of more than 30 years at the Institute for Interdisciplinary Basic Research in Germany.

Although for commercial reasons, exact details of how these microscopes work is a closely guarded secret, the OLS technology makes use of a white light source and a unique and highly optimised optical system using a different approach to optics and mathematics where the maximum resolution limits do not apply. Variable depth of field, between null and 40-80x normal, is no longer interdependent with resolution and magnification.

An extended working distance of 3-5mm allows the use of special enclosed heated chambers where living cells can be cultured and observed for several days. Various serums can be injected into the chamber and the interaction observed under the microscope allowing the effectiveness of the serum to be determined within 30 minutes.

Samples can be observed at normal room temperature using reflected, transmitted or polarised light in real time and true colours where no vacuum, staining or surface coating is required. This prevents falsifications or damage to the samples which are seen in their natural state and not heated more than 5°C by the process.

When compared with fluorescence microscopes, commonly used in biological research, significantly more details could be seen even at high magnifications of living unstained organisms while maintaining the possibility to use markers. As the process is in real time, high quality film and video recordings of living processes are possible where otherwise SEM or confocal microscopes could only take snapshots.

The Ergonom microscopes are easy to use. Those familiar with conventional light microscopes will require just 10 minutes training to use the Ergonom microscope.

The Grayfield contrast method used is a similar to darkfield, yet allowing high contrast, true colour surface details and structures to be seen even in living cells in a way not possible by any other method.

These features allow the Ergonom microscopes to fill the gap between conventional top quality light microscopes and scanning electron microscopes. They can be used in a wide range of applications in the fields of biology, plastics, electronics, metallurgy and nanotechnology where existing microscopes have reached their limits and cannot provide enough detail.

Not surprisingly, there was a lot of scepticism when these microscopes were first put on the market back in 2002. Since then, the microscopes have been further improved and the price is now competitive with modern confocal microscope systems, yet offering significant improvements. At the MicroScience 2006 exhibition, a number of scientists could see and test the Ergonom microscope, generating significant interest in the research world.

Other products available include a 3D optical macro-microscope with up to 30mm DOF, a portable 25-100x microscope with up to 4mm DOF and a closed loop nano positioning system with 2.5nm accuracy over a range of 5cm.

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