

## Antimicrobial Coating for Educational Microscopes

# A Contribution to Laboratory Hygiene

Janika Wiesner, Leica Microsystems



Bacteria are part of our world. There are countless numbers of them in the human body and they are completely harmless. But in people with a weak immune system or at the wrong place they can cause serious illness. Educational microscopes that pass through many hands are potential breeding grounds for germs. To solve this problem, Leica Microsystems and SANITIZED AG in Burgdorf, Switzerland have designed AgTreat™ – an antimicrobial coating technique using the active substance silver for the Leica educational microscopes. Christoph Fankhauser, Customer Support of SANITIZED AG, is responsible for the initialization and coordination of the antimicrobial inspection of customer samples. He reports on the benefits of AgTreat™.



Christoph Fankhauser,  
Customer Support, SANITIZED AG

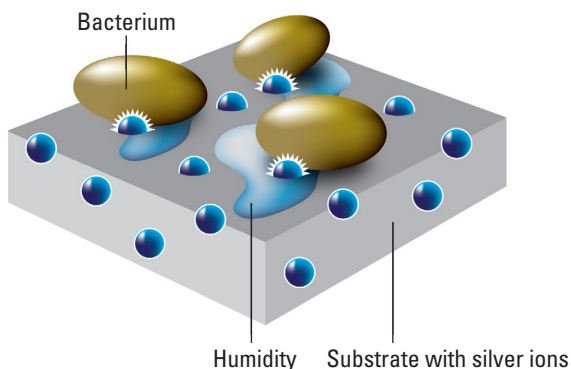
### Why are plastic surfaces like those of microscopes a particularly good breeding ground for germs and fungus?

To be able to spread, germs need a source of carbon to feed on. Many plastics provide such a source. Another major factor, though, are the people working at the microscope, who contaminate the surfaces with an ultrathin film of dead skin flakes, saliva or perspiration. Particles of dust that settle on microscope surfaces can also help bacteria to spread. Regular disinfection is important. If a cleaning cycle cannot be carried out occasionally, or between two cleaning cycles, an antimicrobial coating with AgTreat™ helps keep germ growth in check.

### Why are silver ions so effective against microbial surface pollution?

Silver has long been known as an active substance. Even the Romans were hygiene pioneers in that they used silver cutlery to prevent germs. Silver tablets are used to disinfect groundwater wells in Africa, for example. Silver is highly active, particularly in relation to germs, unicellular organisms and microbes, although this property also has undesirable effects such as staining. The crucial point is: How can this reaction be controlled? To do this, we have incorporated silver particles in a glass ceramic container. This releases the silver particles exactly when they are needed – i.e. at body temperature and high humidity, which are ideal conditions for microbial growth. The positively charged silver then reacts with the negatively charged bacteria. This causes an electric shock that destabilizes the cell membrane of

The silver ion finds the bacterium with the help of humidity and inactivates it.



That is the way silver ions act on bacteria:

1. Destabilization of cell membrane
2. Blocking of respiration
3. Inhibition of ingestion
4. Inhibition of cell division

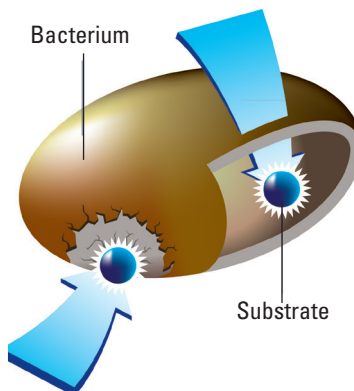


Fig. 1: Antimicrobial function of silver ions

the unicellular organism, preventing cell division and thus inhibiting bacterial growth.

### What harmful bacteria does AgTreat™ protect against?

The AgTreat™ coating protects users from a large number of bacteria types. We examine the particularly relevant germs in our laboratory. Some of them are hospital germs like the methicillin-resistant *Staphylococcus aureus* (MRSA), which is resistant to certain antibiotics and is a particular risk for antibiotic patients whose own immune system is incapacitated. A temperature of about 37°C is ideal for MRSA to multiply and eventually paralyze the complete organism. However, we're also talking about food-relevant germs such as *Escherichia coli* bacteria which mainly populate the intestinal tract but can lead to dangerous infections elsewhere. Food can also often contain salmonella, which cause serious diarrhoeal diseases.



Fig. 2: SANITIZED carries out around 20'000 microbiological tests every year in accordance with standardized methods.

### How do you test the efficacy of the AgTreat™ coating on Leica microscopes?

The surface we are testing is seeded, i.e. brought into contact with, a liquid containing bacteria. The liquid is covered with a film to create an evenly distributed layer. This is then incubated for a day under ideal growth conditions for bacteria at 37 °C storage temperature and at least 90 per cent relative humidity. After 24 hours, the counting procedure is begun to see how many of the original number of about 100,000 germs have survived this test.

### What result did you get for the AgTreat™?

On an untreated sample there are about a million germs after a 24-hour incubation period. On a treated sample, we ideally only find a fraction of the germs that were put there. In the case of the Leica DM500 und DM750 with the AgTreat™ coating, we found that germs had been reduced by between 90 and 99.9 per cent.



Fig. 3: The set of dilution is stroked out with the micro pipette for determining the exact germ count.

### How high do you rate the importance of the antimicrobial function of AgTreat™ for school and university microscopes?

Being young and active, students are usually in contact with a large number of people – not only at university, but also in their free time. This means that any germs they encounter could multiply very rapidly. The danger is when germs are passed on to people whose immune system is temporarily or permanently weakened in some way. Large groups of people with different physical conditions and hygienic requirements are always a potential risk in this respect.

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**Eileen Sylves** supervises the General and Developmental Biology student laboratories at the University of Buffalo, NY. There, the students examine various types of cells under the microscope. She explains why the faculty deliberately chose the Leica DM750: "Besides their excellent optics and illumination, we liked the fact that the educational microscopes of Leica Microsystems are easy to pack and to move from one laboratory to another. However, the key deciding factor was the AgTreat™ coating. We have up to twelve different people using each microscope. The silver ion coating protects our students from the germs they would otherwise be exposed to, particularly in the winter months."

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# Microscopes for Schools, Universities, and Vocational Training – Made For Future Experts

The more time an instructor has to teach, the more students can learn. The Leica educational microscopes were specifically designed for “plug and play” ease of use. They help to improve teaching and to achieve the goal of more hands-on time for microscopy courses. With many student-friendly features and high-quality construction, the Leica DM500, DM750, DM750 P, and DM750 M invigorate learning and teach the next generation of microscopy experts effectively and efficiently. Based on the same optical platform as Leica Microsystems’ research microscope line, students enjoy outstanding optical performance with full access to virtually all accessories from the Leica

Microsystems microscope product line. The new 100x dry objective provides very high resolution ( $NA = 0.8$ ) while eliminating the oil.

Especially in educational environments the spread of disease from surfaces is of great concern. Leica Microsystems has integrated the AgTreat™ additive so that all microscope touchpoints are treated to inhibit the growth of bacteria. This helps to prevent the spread of disease via the microscope surfaces and leads to a healthier laboratory environment.

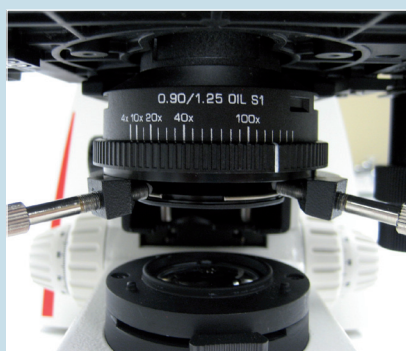


## Leica DM500

The Leica DM500 with “plug and play” capability is the perfect tool to make teaching entry-level courses easy and fun. The pre-focused, pre-centered condenser and the EZTube™ preset diopter, which prevent incorrect adjustments, provide more time for hands-on teaching. EZStore™ design with integrated handle and cord wrap allows easy carrying and protection against damage.

## Leica DM750

The Leica DM750 is ideal for advanced college and university courses. Student-friendly features such as the EZStore™ and EZGuide, which allows one-handed slide loading and reduces slide chipping, provide a safer classroom environment. EZLite™, which provides over 20 years of LED illumination and automatic time delay shutoff, saves time and energy.



## Leica DM750 P

The Leica DM750 P is the ideal polarizing microscope for teaching material and earth science college and university courses such as crystallography and petrography. It includes all features of the Leica DM750.

## Leica DM750 M

The Leica DM750 M is an entry-level materials microscope for bright-field, oblique and polarized light. It was specifically designed to serve the needs of standard quality control and materials analysis in the QC-laboratory as well as the general educational needs in universities of applied sciences and technical colleges.

