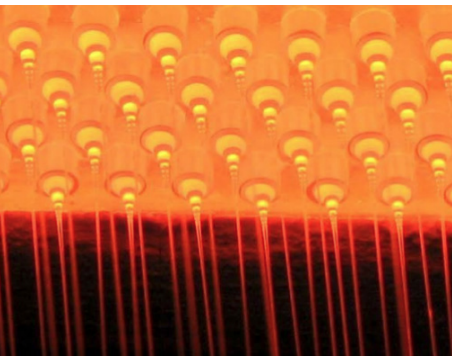
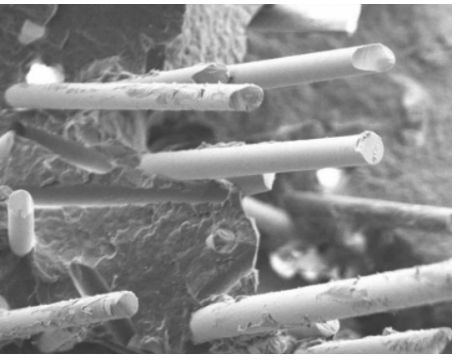
METAL COATING OF GLASS FIBERS FOR ENHANCED SEM IMAGING





EFFECTS OF METAL SPUTTER COATING?

SEM images are generated by scanning an electron beam across the sample. This effectively adds electrons to Glass fiber is a material consisting of numerous extremely fine fibers of glass, typically with diameters of 3 µm up to 20 µm. Glass fibers are used in combination with polymers to obtain a reinforced plastic. Glass-reinforced polymer is a composite material or fiber-reinforced plastic made of a plastic reinforced by fine glass fibers. As with many other composite materials, the two materials act together, each overcoming the deficits of the other. Whereas the plastic resins are strong in compressive loading and relatively weak in tensile strength, the glass fibers are very strong in tension but tend not to resist compression. By combining the two materials, Glass-reinforced polymer becomes a material that resists both compressive and tensile forces well. According to the use, the glass fibers can be made of different types of glass. Uses for regular glass fiber include mats and fabrics for thermal insulation, electrical insulation, sound insulation, high-strength fabrics or heat- and corrosion-resistant fabrics. It is also used to reinforce various materials, such as tent poles, translucent roofing panels, automobile bodies, boat hulls, and paper honeycomb.

SEM imaging is an ideal tool to check the homogeneity and dispersion of glass fibers in a polymer matrix. Other defects such as poor adhesion of the fibers to the polymer matrix (shown as clean fibers) can also easily be detected. Chemical microanalysis techniques (EDS) used in conjunction with scanning electron microscopy offers additional information about the composition of the fibers.

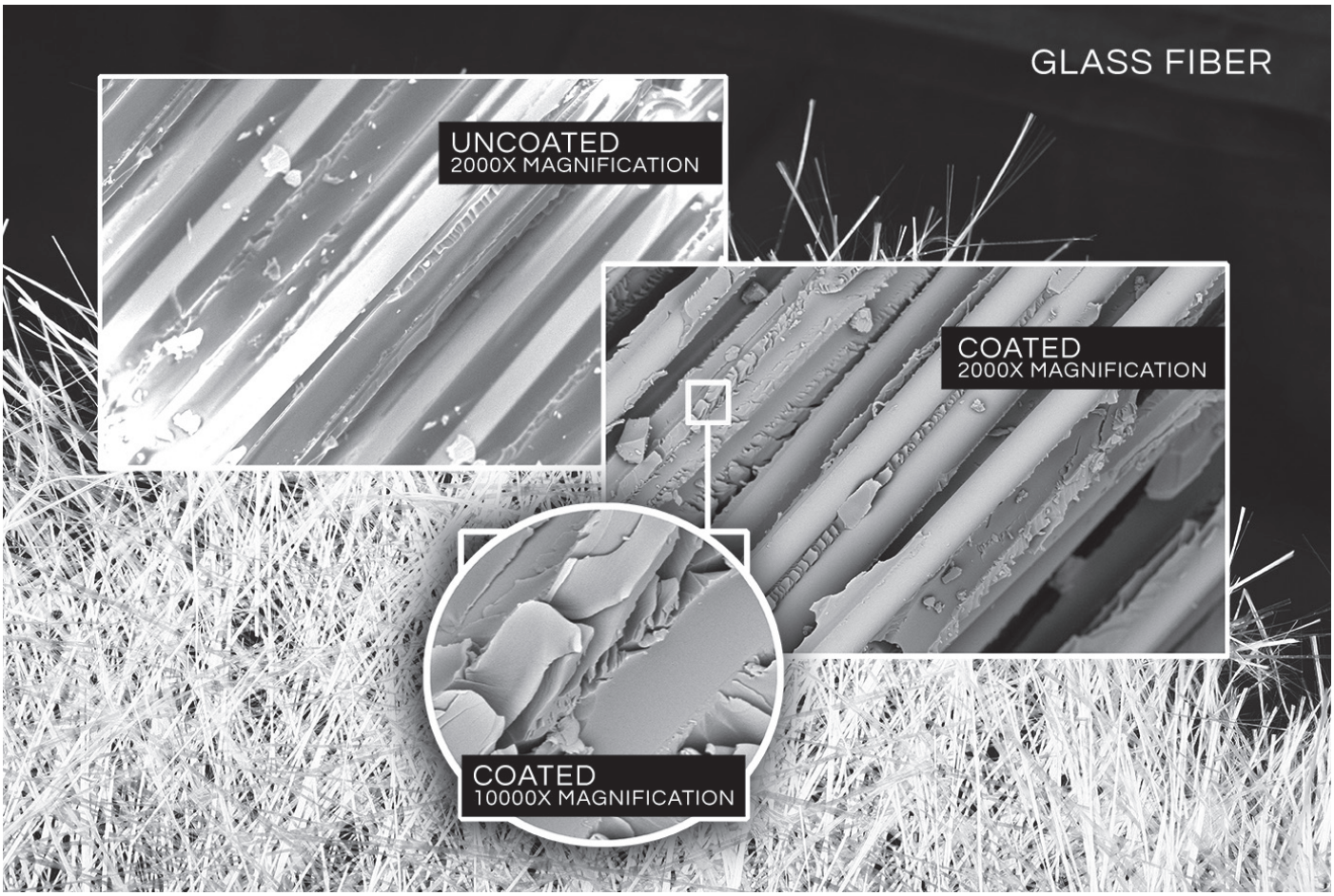
As already mentioned, glass fibers and a lot of polymers are good thermal and electrical insulators. This means that when they are scanned by the electron beam in a microscope, sample charging will often occur.

WHAT IS SAMPLE CHARGING, WHAT ARE THE EFFECTS OF SAMPLE CHARGING ON SEM IMAGING, AND WHAT ARE THE POSITIVE EFFECTS OF METAL SPUTTER COATING?

SEM images are generated by scanning an electron beam across the sample. This effectively adds electrons to the sample.Sample charging occurs when samples are bad electrical conductors which means there is no conducting path for electrons to flow from the sample surface towards the sample holder. Sample charging causes all kinds of problems such as drift, blur, and low contrast. In other words, blurry and false images.

By applying a very thin electrically conducting layer of metal such as gold or platinum (a process known as metal coating or sputter coating) onto the surface topography of the specimen, the electrons can flow from the sample surface towards the sample holder and sample charging is prevented. Other positive effects from sputter coating a sample are an improved secondary electron emission, a reduced beam penetration with improved edge resolution and a better protection of electron beam sensitive samples.

Luxor metal coaters are designed to automatically apply a homogeneous and thin metal layer to your SEM samples, protecting them from any charging effects and enhancing the image resolution in your electron microscope.

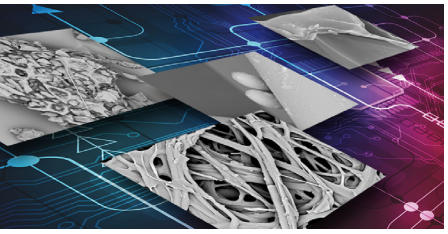


IMAGING AND COATING CONDITIONS

SEM images were recorded with a Thermo Phenom XL desktop electron microscope using the BS detector in high vacuum mode (1 Pa) at 10kV. A 10nm gold coating was applied using the LUXOR Au metal coater.

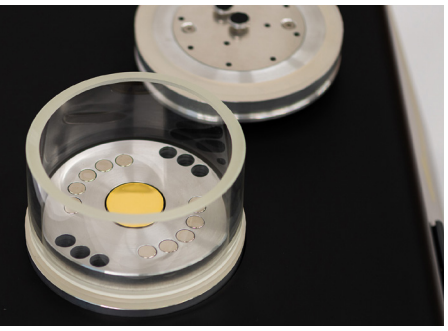
SPUTTER COATING WITH THE LUXOR METAL COATER

LUXOR metal coaters are used extensively in SEM and TEM labs worldwide where image quality and high resolution imaging are of the utmost importance. Metal sputter coating not only prevents sample charging, but also provides improved edge resolution and a better protection of electron beam sensitive samples. Even at relatively low magnifications sample coating offers additional security in a high throughput environment with multiple operators having to provide high quality images in a routine analysis environment on a large variety of samples.



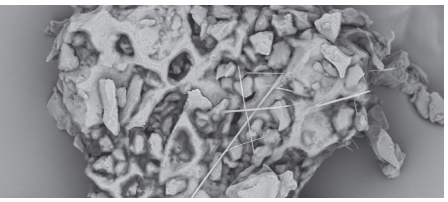
A² TECHNOLOGY

LUXOR's unique A² Technology generates a metal plasma and applies it in a controlled and accurate manner, resulting in an extremely uniform, thin and homogeneous metal layer. The unique way this process is controlled and adjusted is what distinguishes the LUXOR metal coaters from other commercially available instruments. For the SEM operator this means more homogeneous metal coatings, resulting in high resolution and high contrast images and a worry-free coating process without any manual intervention.



UPSIDE DOWN DESIGN

In the LUXOR metal coaters, the samples are mounted upside down. While this might seem a little controversial at first sight, it is actually a consequence of our 'form follows function' approach. In fact, the upside down architecture brings many advantages. First, all high voltage and high current wires are safely hidden within the instrument. This obviously greatly reduces the risk of electric hazards. Next, the sample loading station is easily accessible and allows to apply or remove the samples without the need for special tongs or tweezers. This doesn't just make everyday use easier, but also speeds up productivity. The upside design also makes sure that loose particles will be removed during the coating process. This way, your SEM is optimally protected.



FULL AUTOMATION

The coating process is fully automated. As soon as your samples are loaded into the preparation station, you only have to choose the desired coating thickness and push the start button. Thanks to this user friendly process, the chance of human errors is significantly reduced. Furthermore, this means that untrained operators and lab personnel can operate the device.

Do you want to learn more about how LUXOR metal coaters can help you with your everyday SEM or TEM work?

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or find a point of sale close to you on our contact page luxor-tech.com/contact