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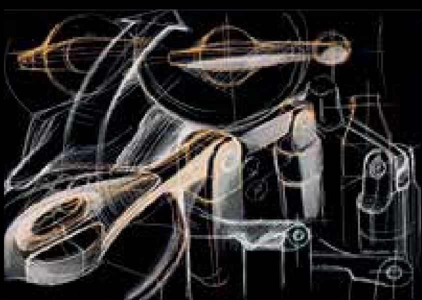
Tennant20

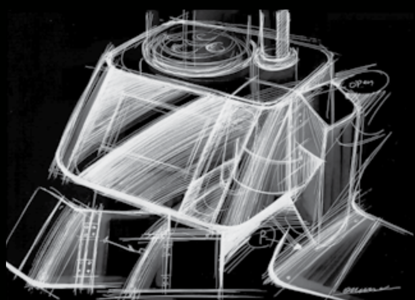
New Osmium Coating System with Enhanced Features

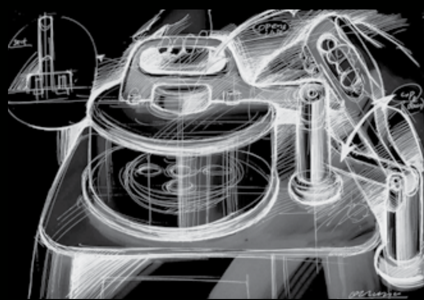
meiwafosis

Nov, 2022

Tennant20
New and Improved







The handle shape is suitable for opening/closing the lid,
the angle of the screen is optimized for better digital communication,
and the body is adjusted to smooth ampule handling.
All details ensure easy operation and maintenance.

Product Designer Atsushi Onuma

Better Usability Safer Operation

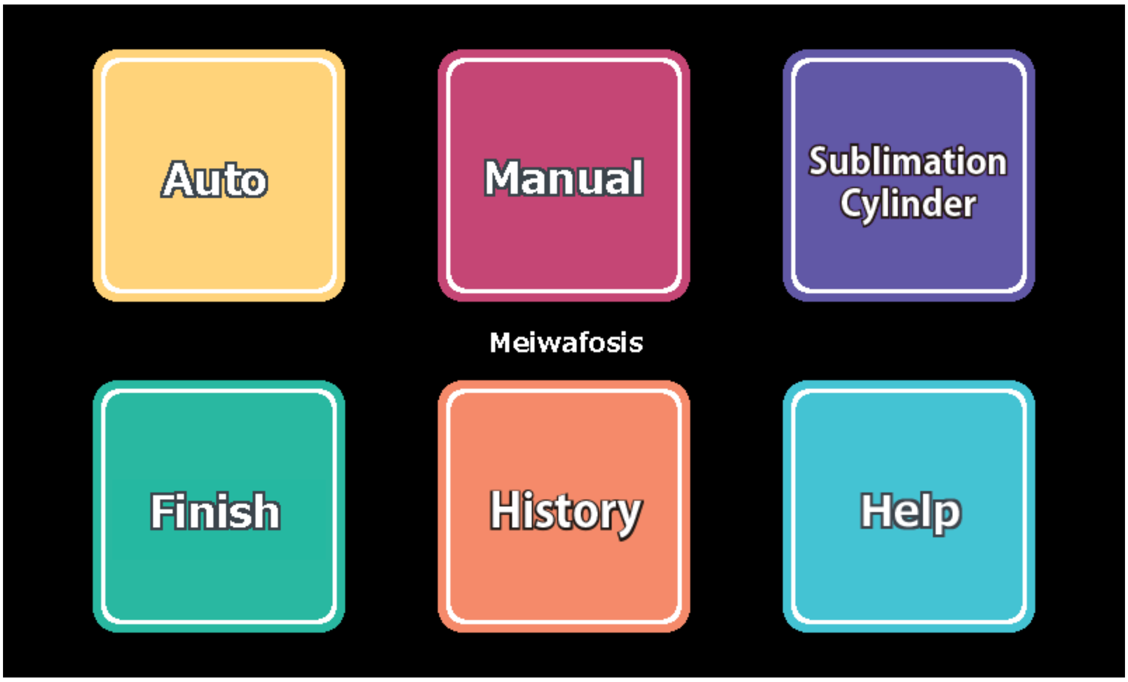
Meiwafosis Co., Ltd. developed original discharging electrodes and released „Multifunction Coater“ with sputter coating, plasma CVD and hydrophilic treatment features in 1997. We made a continuous improvement in the system for more than 20 years and developed „Neoc Osmium Coater -Neoc Series-“ with a much larger negative glow charge phase by special electrodes. The deposition quality is superior to the sputter coater. The Neoc Series have been used in various research fields such as SEM observation and elemental analysis since its release.

In 2021, we success fully created the advanced osmium coating system „Tennant 20. „The new system reflects our firm belief that our products should be user-friendly and safe. Keeping the original features and functions, it has additional advantages.

The Tennant 20 was developed at our laboratory in Tokyo Metropolitan Industrial Technology Research Institute (TIRI).

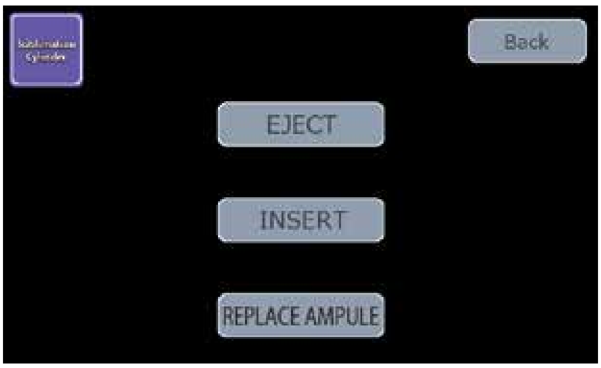
Simple Operation Screen

The operation screen is simple and intuitive. Even a first-timer can operate the device easily.



There are six options on the main screen. After selecting one, just follow the instructions.

Eject/ Insert Sublimation Cylinder



Eject, insert the sublimation cylinder or replace the Os ampule.

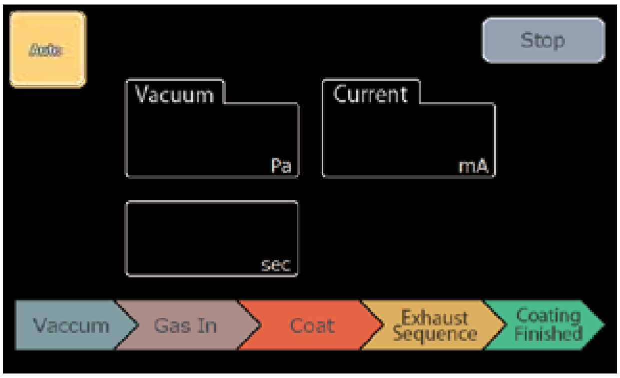
The instructions are shown in an interactive way. Every exchange step is guided, easy and safe.

Finish

The Finish mode is for vacuum shut-down after use.

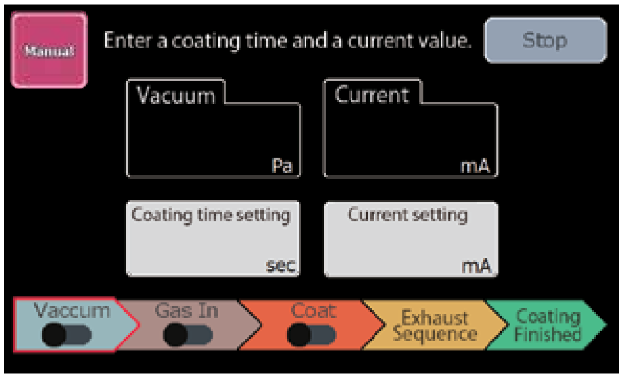
It can keep the chamber under vacuum - dry and safe.

Auto



All you have to do is enter a film thickness value. Vacuuming, coating, and exhaust sequence is executed automatically.

Manual

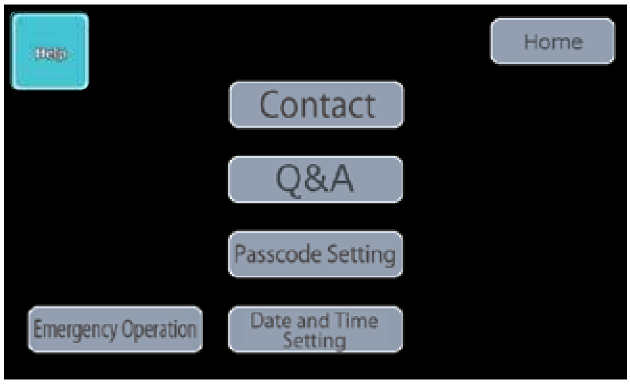


Manual operation option is available. You can set the timing of gas inflow, the coating time and the current value.

History

History shows the user, the date, and the conditions. It also records the dates of ejecting/inserting the sublimation cylinder.

Help



Contact information, Q&A, passcode setting, date and time setting, emergency procedure are available under Help.

Tennant20 Power Control

The Tennant20 is feedback controlled to stabilize the coating current to realize highly reproducible film deposition.

The coating current is measured every 1/10000s and analyzed by a 32-bit microprocessor.

Based on PID control, the output of the discharge circuit is adjusted by calculating the coating power in order to reach the set input current value using a unique algorithm.

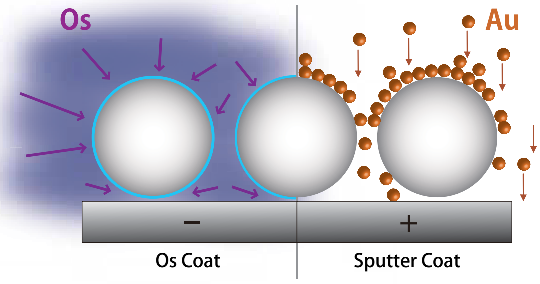
Ultrathin Film Without Charge-up

Even if a sample has a complicated structure, an Os conductive coating fully and deeply wraps around every side of the sample. Although it is a ultrathin film, there is no need to be concerned about charge-up in the electron beam.

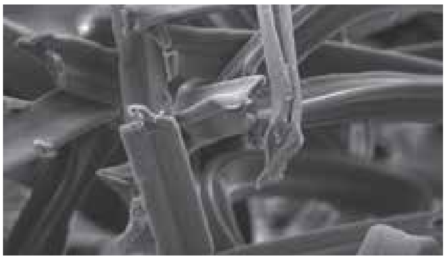
Coating States

Os is one of the platinum group metals (atomic number 76).

Os coating does not cause any heat damage to a sample.



Acetate Fiber



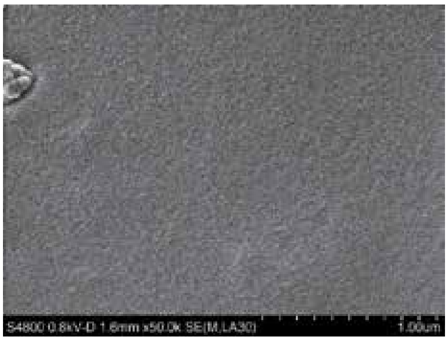
Os Coat Magnification : x500

Os PE-CVD Coating provides a great isotropic, conductive coating for SEM imaging without losing the original surface texture. The different appearence of the surface is visible even at a lower magnification.

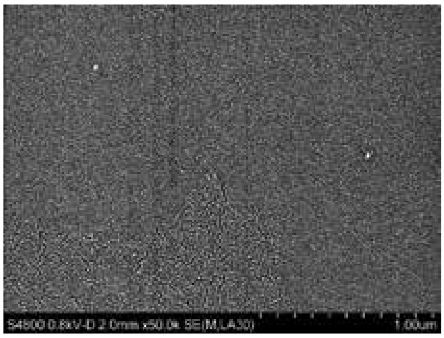
Au Sputter Coat Magnification : x500

Au Sputter Coating is an anisotropic, directional coating process. It does not fully wrap around the sample which can cause charging effects in some areas. The surfaces look metallic and overexposed.

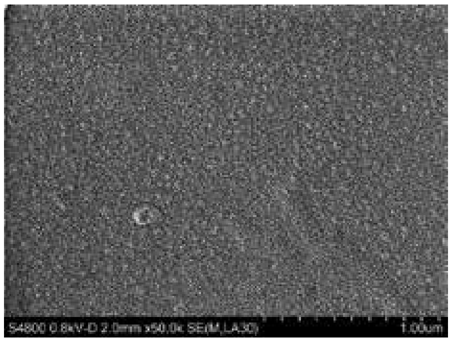
SiC Wheel



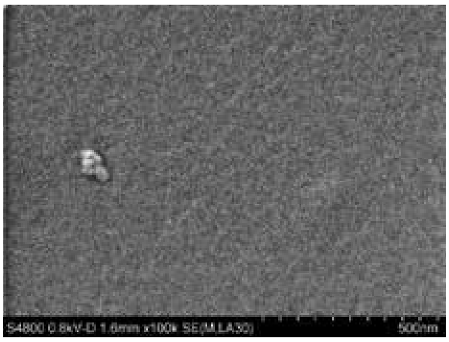
Os Coat Magnification : x50,000



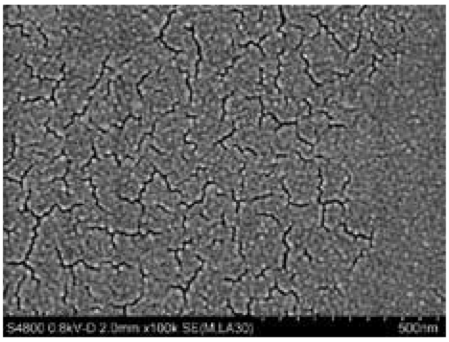
Au Sputter Coat Magnification : x50,000



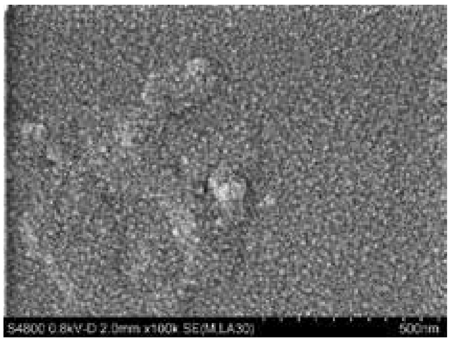
Pt Sputter Coat Magnification : x50,000



Os Coat Magnification : x100,000



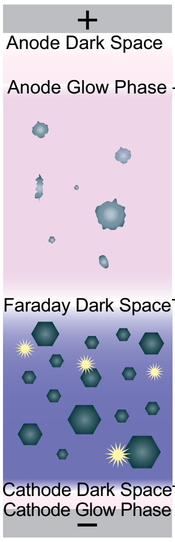
Au Sputter Coat Magnification : x100,000



Pt Sputter Coat Magnification : x100,000

Plasma CVD
Pure Os Metal Conductive Coating

By the plasma CVD method, osmium tetraoxide sublimation gas is introduced into the vacuum chamber and plasma is generated by DC glow discharge. During the process, the chamber is separated into two areas: „positive column“ and „negative glow phase“.



Plasma States Under Glow Discharge

Positive Column Area (OsO_4 Coat)

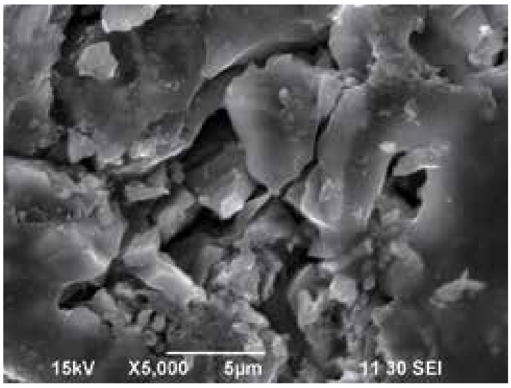
As residual gas and unstable Os ions are in the positive column area, an OsO_4 coat is formed.

It is vulnerable to electron beam damage and easily destroyed.

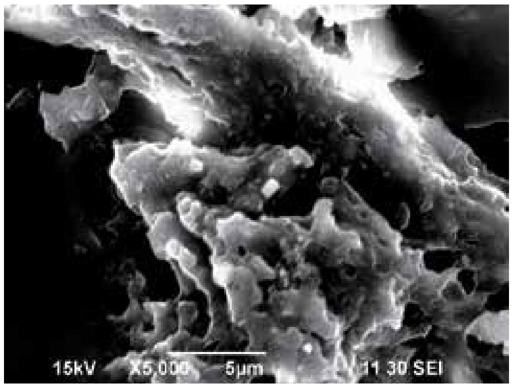
Negative Glow Phase Area (Pure Os Coat)

Positive Os-ion gas molecules concentrate and collide with each other in the negative glow phase area. Here a pure Os metal conductive coating is formed. Even an ultrathin pure Os film can produce a strong amorphous conductive coating which is resistant to electron beam damage.

SiC Wheel



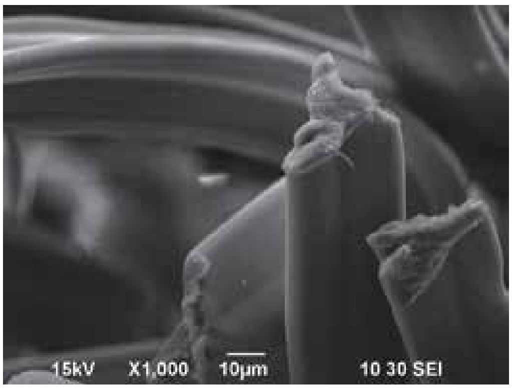
Negative Glow Phase Magnification : x5.000



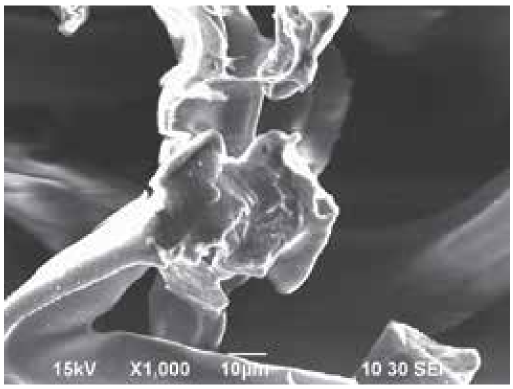
Positive Column Magnification : x5.000

While the details can be observed without charge-up after the sample is coated in the negative glow phase, there is some charge-up in the sample coated in the positive column area as an OsO_4 coat is susceptible to electron beam damage.

Acetate Fiber



Negative Glow Phase Magnification : x1.000



Positive Column Magnification : x1.000

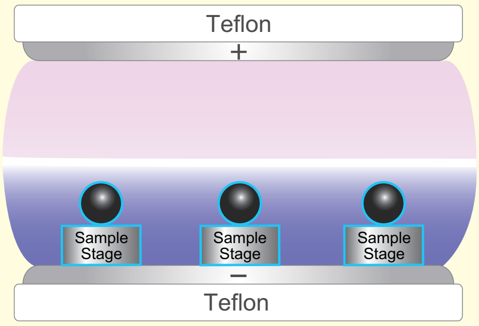
Even for samples which are usually difficult to image, as they are easily affected by charging and drifting, Os coating provides a clear image when it is purely coated in the negative glow phase area in our Os coating system.

Large Negative Glow Phase Area

··· Positive Column Area (OsO4 Coat)

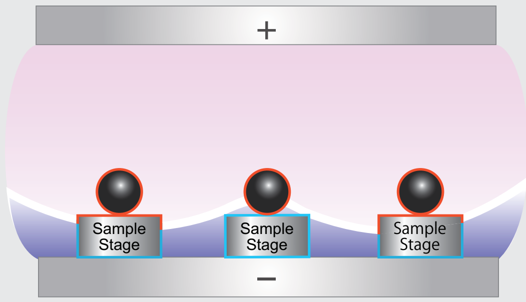
··· Negative Glow Phase Area (Pure Os Coat)

Electrodes for Tennant20 and Neoc



20mm high uniform coating

Conventional Electrodes

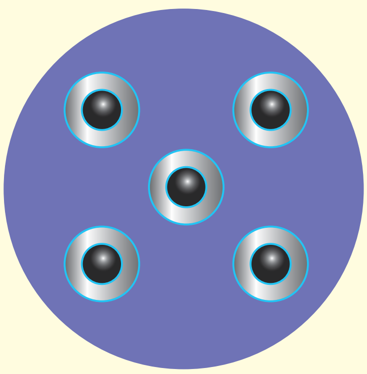


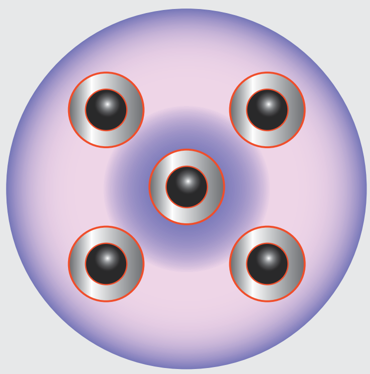
5mm high non-uniform coating

Height of Negative Glow Phase Area

The negative glow phase area of conventional electrodes is only 5mm high. An OsO4 coating is formed in the positive column area if a sample is taller than 5mm.

The Tennant20 creates a larger negative glow phase area (20mm high) and larger samples can be coated in superior quality.





Negative Glow Phase Area

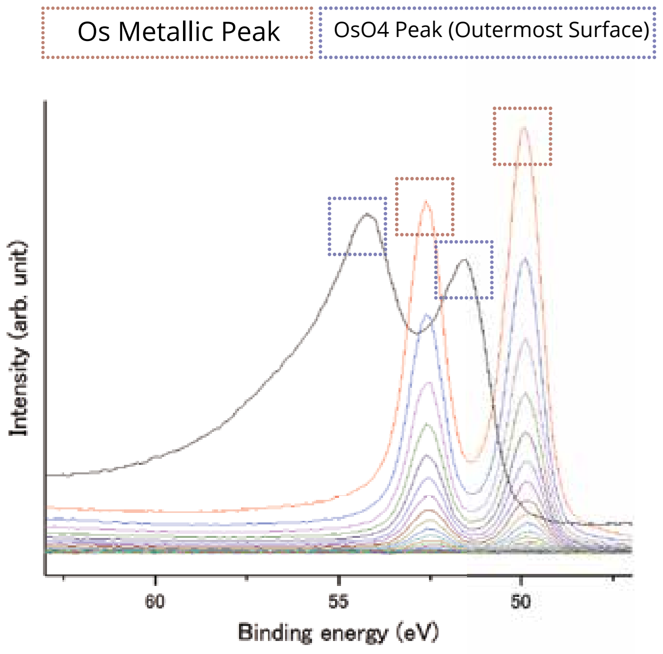
For conventional parallel plate type electrodes (image on the right), the coating thickness is non-uniform with conventional parallel plate type electrodes. It is thick at the center and the edge but it is thin in the center ring. The electrodes of the Tennant20 (image on the left) have a special design so that the discharge is not only centered on the edge, but shows a uniform negative glow phase in the whole sample holding area.

Pure Os Coat

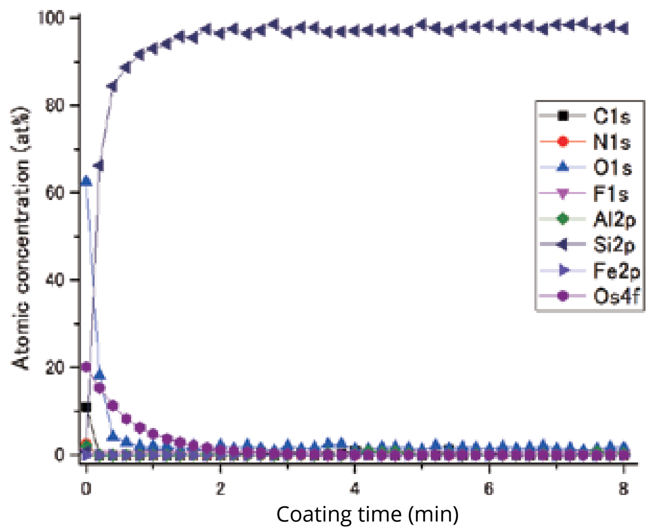
A 10nm thick Os coating on an Si substrate is analyzed by an X-ray photoelectron spectrometer (XPS). The outermost surface of the Os coating is OsO4, but under the oxidized layer pure metallic Os is observed. This suggests that the coating is pure Os, but a natural oxide layer forms on the surface, as Os is a metal.

While slight amounts of other materials such as C and N are detected on the outermost surface, no other elements can be seen in the Os metallic film. The Tennant20 can coat a sample with pure Os in the 20mm high negative glow phase without any contaminants.

XPS Os Peak



XPS Depth Profile



Measurement Device	: X-ray Photoelectron Spectroscopy / XPS PHI Quantera II™ (ULVAC-PHI, INCORPORATED.)
X-ray Source	: AlKa
Pass Energy	: 140eV
Measurement Range	: Cls, Nls, Ols, Fls, Al2p, Si2p, Fe2p, Os4f
Sputtering	: Total 40 times per 0.2min (8min)
Sputter Source	: Ar+ ion (irradiated area 2x2mm, 4kV)
Os Coating System	: Neoc-Pro/P Os coater (predecessor of Tennant20)

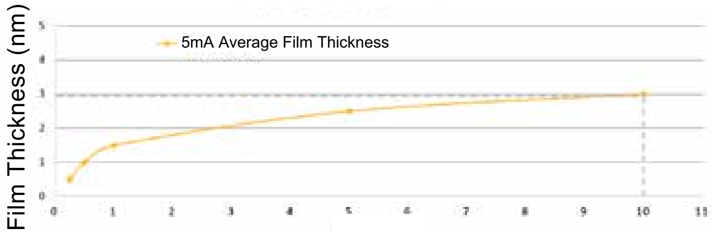
SEM, EDX, AES, XPS, EBSD Preparation

Film Control With High Reproducibility

Our Os coating systems can deposit ultra-thin (1 nm or less) to thick films with a timer control of 1/100 second. As the amount of Os coating is roughly proportional to the discharge time, a film thickness can be easily controlled at nanometer level.

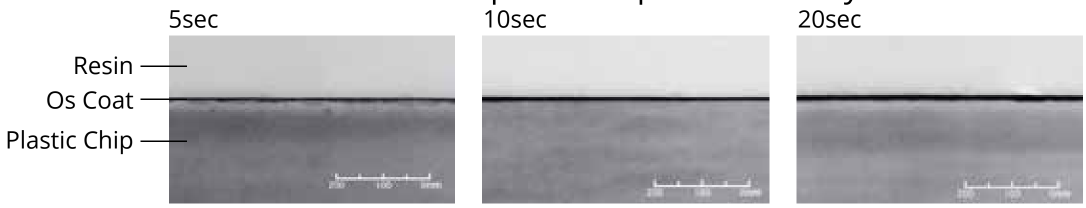
Our Os coating systems can control and form an ultra-thin film with high reproducibility. Therefore, they have been used for a wide range of purposes such as SEM observation, elemental analysis of insulators and as antistatic film for top surface analysis.

Deposition Time / Film Thickness



* Measured by FS-1 Multi-Wavelength Ellipsometer (Film Sense)

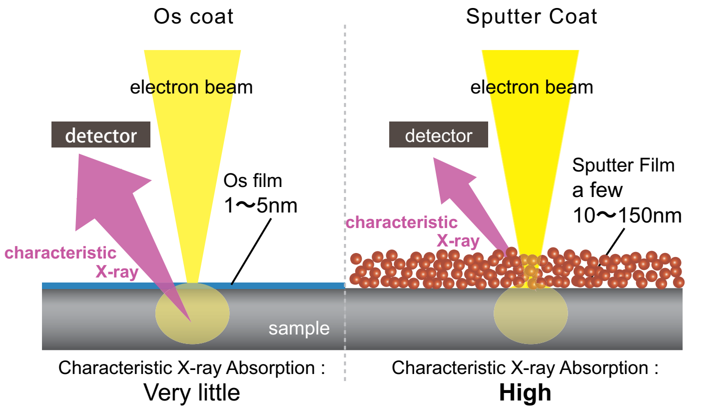
▼ Coated plastic chip measured by TEM



EDS Quantitative Analysis Suitable For Light Elements

For conventional sputter coating (right), a film thickness of over several 10nm was needed when a whole sample was coated as an antistatic film for EDS analysis (Energy Dispersive X-ray Analysis). As characteristic X-rays were absorbed into an antistatic film, quantitative analysis always required correction.

However, the Neoc and the Tennant20 (left) can deposit a uniform Os film (a few nm) on a whole sample, and very few amounts of characteristic X-rays are absorbed. Analysis results can be obtained without being affected. They are suitable for EDS quantitative analysis, especially of light elements such as C and N.

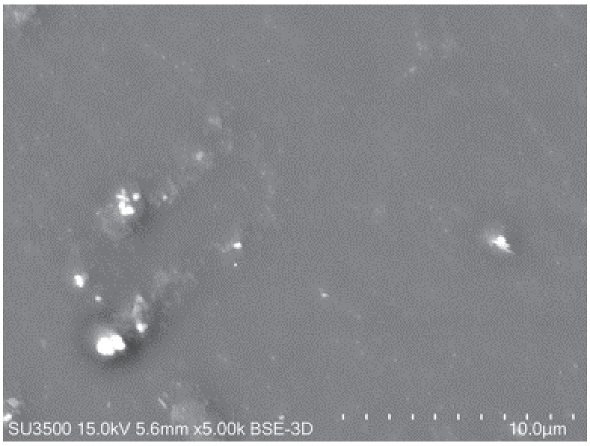


Reference: „EDS quantification of light elements using osmium surface coating" Journal of Mineralogical and Petrological Sciences,
Volume 110, page 189-195,2015
Ehime University, Geodynamics Research Center
Prof. Hiroaki OHFUJI, Mr. Masashi YAMAMOTO

Energy Dispersive X-ray Spectroscopy Analysis

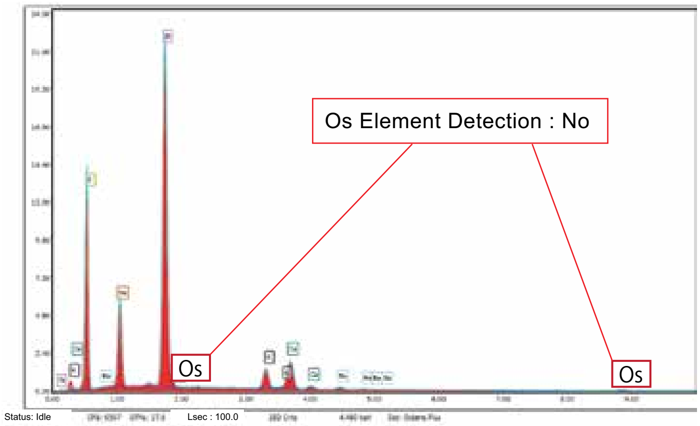
A less than 1nm Os coat by the Neoc is analyzed by EDS (Energy Dispersive X-ray Spectroscopy Analysis).

Au and Pt elements are detected in the Au and Pt sputter coats. But as shown in the graph, an Os element is not detected as the Neoc can deposit an ultrathin film less than1 nm, which enables you to obtain data without any effects on EDS analysis.

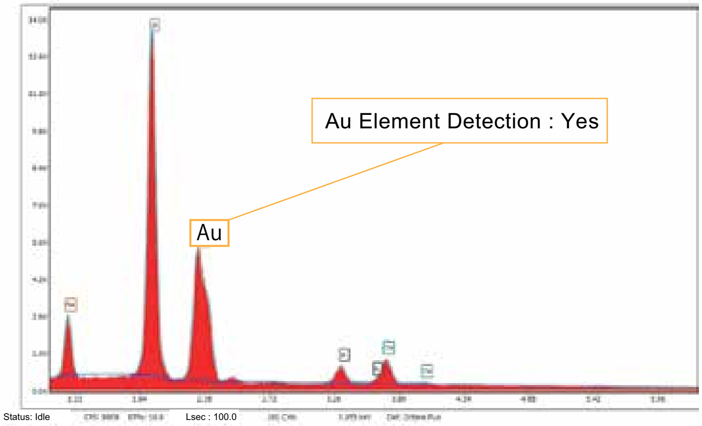


Measurement Device	: SU3500 Scanning Electron Microscope (Hitachi High-Tech)
Measurement Range	: S1, K, Ca, O, Ba, Na, Zn, Au, Pt
Os Coating System	: Neoc-Pro/P Os coater

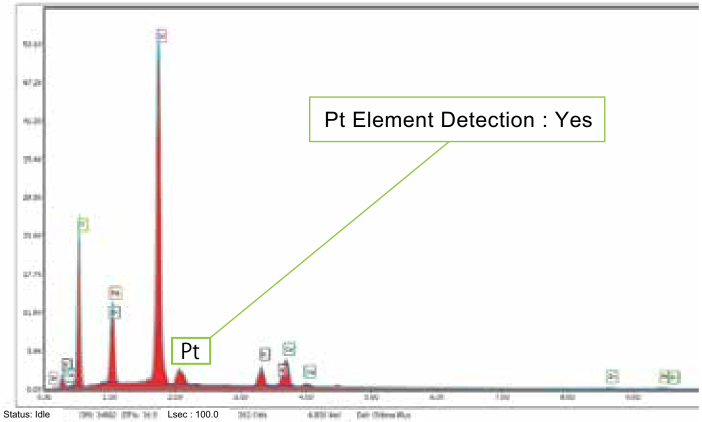
Os Film



Au Film



Pt Film



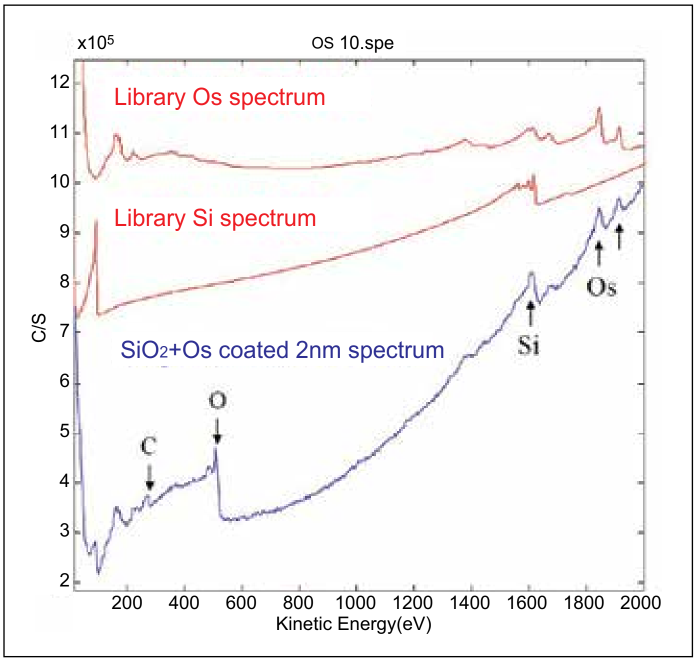
Antistatic Films

Antistatic Films for Auger Electron Spectroscopy (AES)

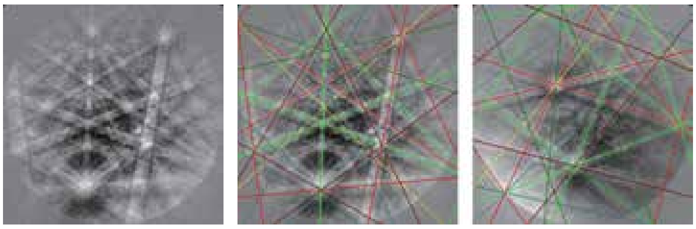
Since Auger Electron Spectroscopy (AES) involves the study of top surfaces (areas around 5nm lower than the surfaces), our coating technology is effective in controlling film thickness at nano level.

As shown in the right graph, Auger electrons of the substrate Si are clearly detected without being affected by the antistatic film after the sample (SiO2) is coated by a 2nm Os film as an antistatic. Even elements of insulating materials can be analyzed without any charge-up.

Data provided by Yazaki Corporation



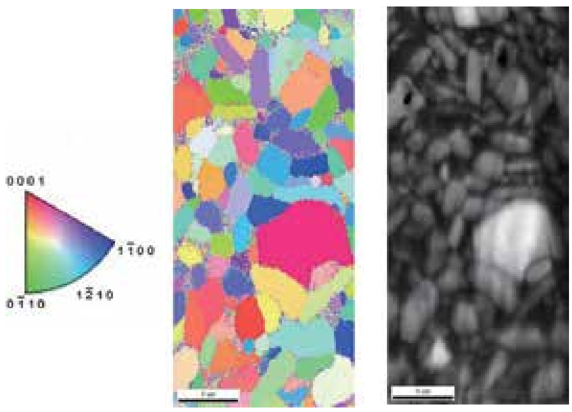
EBSD Antistatic Film



Alumina (Around 50x70x4mm t)

Testimonials

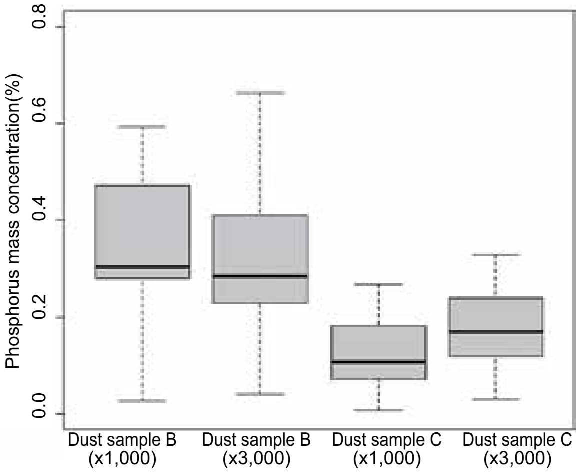
For EBSD of non-conductive materials, a surface coating is required that maintains surface conductivity. Also, the surface coating should not interfere with reflected electron beams from crystals near the surface, and should be resistant to electron beams. Os coating provides a thin and strong conductive film, and produces very clear Kikuchi lines.
In addition, even a porous sample can be fully coated by the Os coater, and it can be observed clearly without being charged.



FE-EPMA Preparation
(analysis/observation of dust in vehicle)

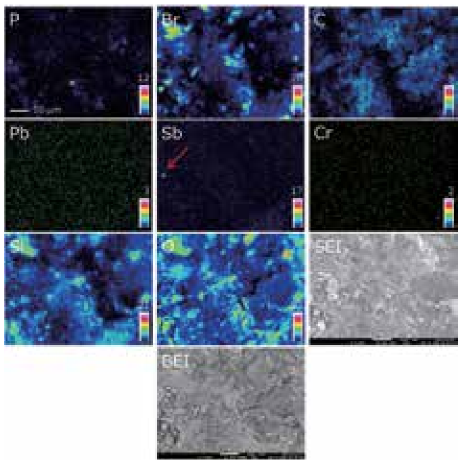
Phosphorus Quantitative Analysis by FE-EPMA

A phosphorus quantitative analysis can also be conducted.

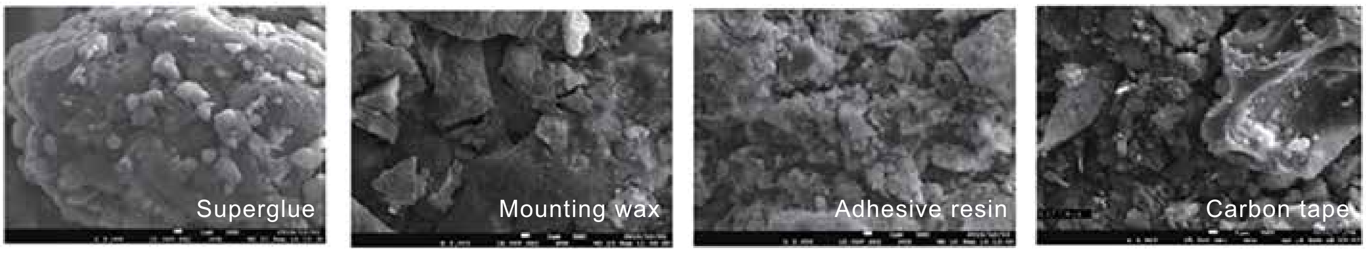


Color Mapping for SEI·BEI

Several elements can be analyzed, and Os coating is effective for FE-EPMA preparation.



Secondary Electron Image For Each Fixation Method



Good observation results are obtained even for uneven samples. Magnification: x3.000

❥ Testimonials

It is dangerous to be exposed to pollutants through dust in a vehicle. Such pollutants contain both organic and inorganic substances. Therefore, we had to take different complicated preparation steps and needed different analytical instruments. The development of easier measurement methods had been always desired to assess dust pollution. Our laboratory analyzed elements of pollutant indicators in dust in a vehicle by Field Emission Electron Probe Micro Analyser (FE-EPMA) (Environmental science, 30[1] 34-43, 2017). We used the Neoc-STB for preparation.

FE-EPMA is an instrument which detects emitted characteristic X-rays by irradiating electron beams on a sample surface and analyzes elements and quantity. As both organic and inorganic substances can be detected at the same time and the analysis can be done locally, Os coating is suitable for minute samples such as dust.

Data provided by Prof. Shigeki MASUNAGA, Yokohama National University, Graduate School of Environment and Information Science

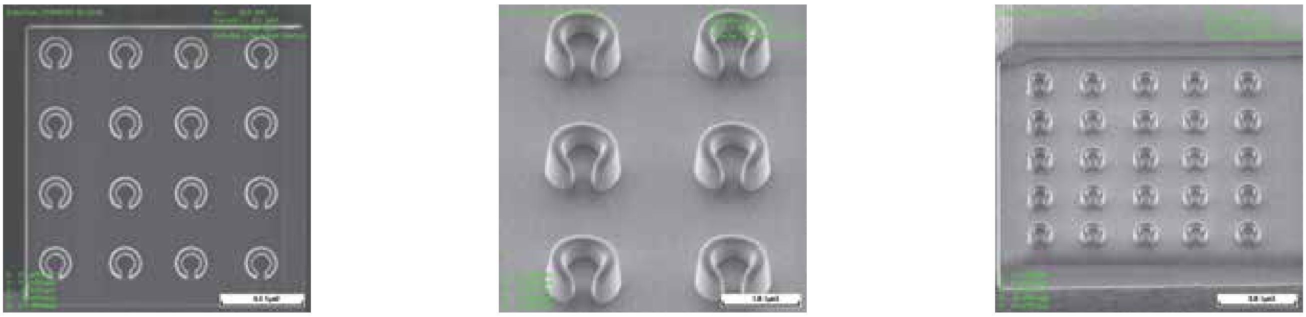
Observations and Measurements

FIB Processing Treatment

An Os metallic film is used as a protective film for FIB processing treatment. As Os films are thin and higly conductive, and release heat, they protect sample surfaces from FIB processing damage. They can be easily removed by hypochlorous acid and used for different analyses after FIB processing treatment.

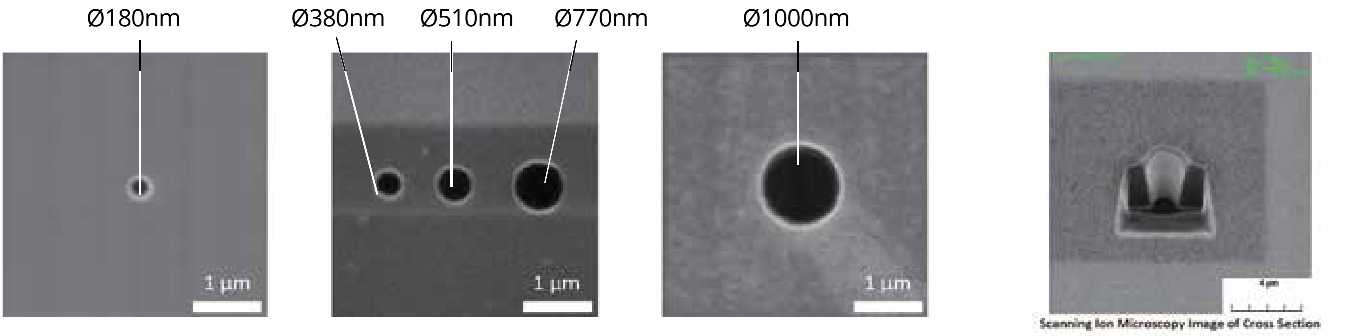
Molds for Metamaterials: SIM Images

The material is single crystal diamond and all the edges of C m olds are curved by FIB.



Data provided by Prof. Masahiko YOSHINO, Dept. of Mechanical Engineering, Tokyo Institute of Technology

SIM Images of Nanopores Perforated by FIB in 4 μm Glass



Data provided by Associate Prof. Takatoki YAMAMOTO, Dept. of Mechanical Engineering, Tokyo Institute of Technology

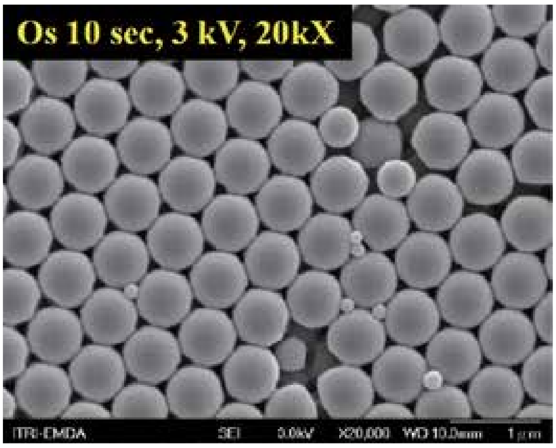
Osmium Coating Strengthens Cantilevers

The tips of SPM/AFM cantilevers are subject to a very strong electric field according to calculations.

Therefore, Au coated cantilevers easily become useless since the tips are severely damaged after a couple of measurements. However, Os coated cantilevers are more resistant to damage caused during measurement. Such cantilevers can be reused, which saves a lot of costs.

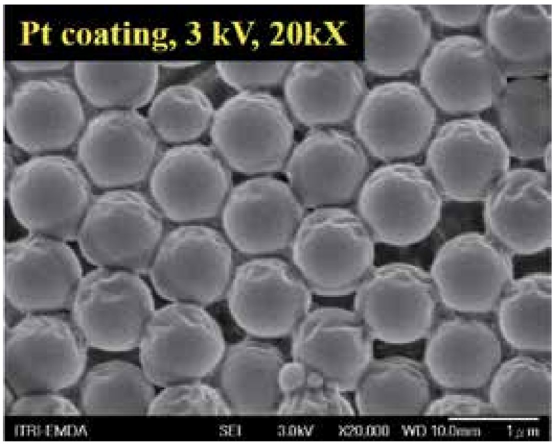
Data provided by Dr. Toru Nakamura, Advanced Industrial Science and Technology

Os Coat



Magnification : x20.000

Pt Coat



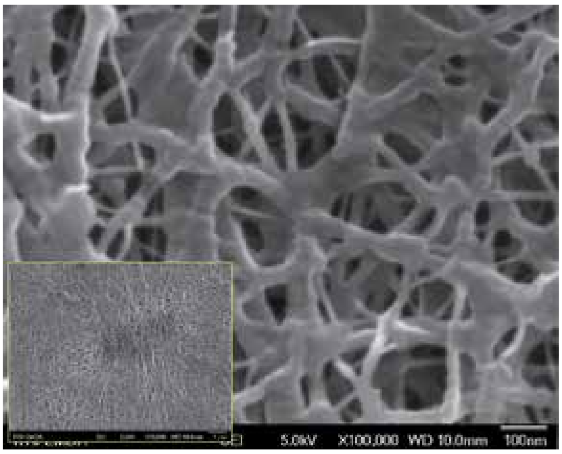
Magnification : x20.000

No Damage
From Heat and Electron Beams

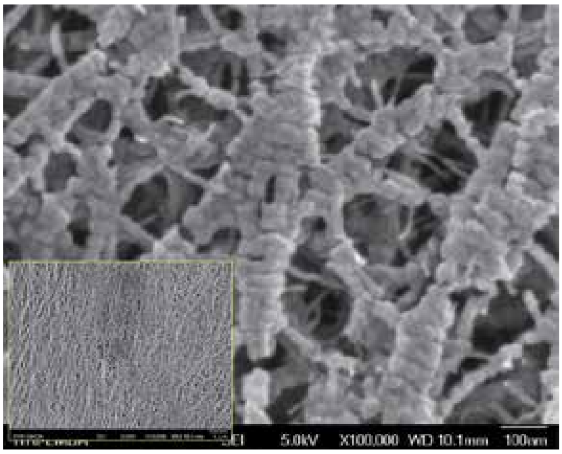
Polymer Beads

Electron beams cause significant damage to the surface of a Pt coated sample. However, the Os coated sample provides a clear image without any damage and charge-up even though it is a thin film.

Data provided by The Industrial Technology Research Institute (ITRI)



Magnification : x100.000



Magnification : x100.000

No Granularity
At High Magnification

Polymer Film

A huge difference can be seen at a high magnification (x100,000). In the right image Pt has been sputtered on the sample and it is hard to see the original surface structure.

On the left side, no granularity is visible on the Os coated sample at a high magnification and you can see the actual surface structure. Also Os coating does not cause heat damage to organic samples due to the low landing energy.

Data provided by The Industrial Technology Research Institute (ITRI)

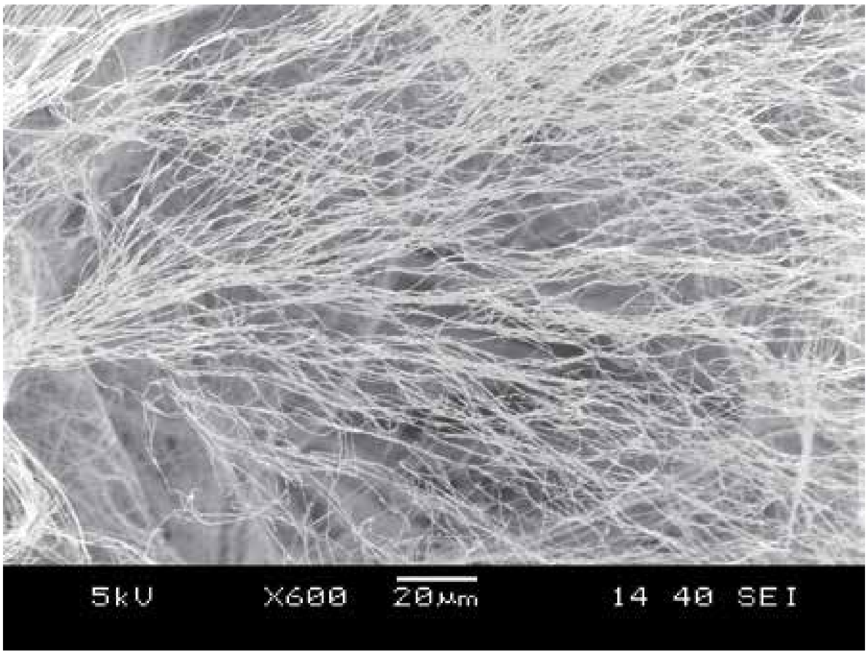
Observations and Measurements

No Damage To Brittle Samples

Amino Acid Freeze-dried Cake

OS Coat ▶

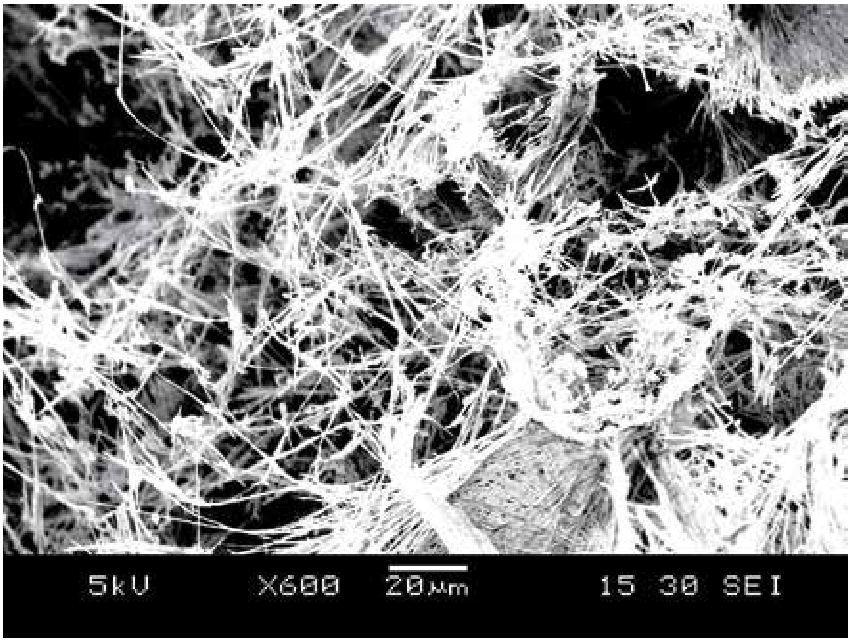
Freeze-dried cake has a complicated matrix structure. It is easily blown up and susceptible to heat. An Os coating provides a clear image of the original structure without any damage.



Acceleration Voltage: 5kV Magnification: x600

Pt Coat ▶

The network of the freeze-dried cake is blurred, and the shadowed area and the depth are not clear. The matrix structure gets crushed or fragmented by sputter particles.



Acceleration Voltage: 5kV Magnification: x600

Data provided
by Prof. Chikamasa YAMASHITA,
Tokyo University of Science,
Faculty of Pharmaceutical Sciences

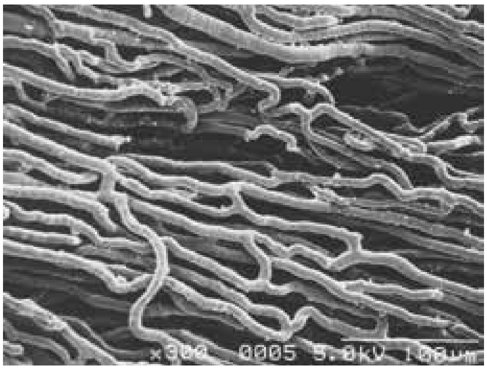
No Heat Damage to Biological and Fiber Samples

Replicas of Rat Cardiac Blood Vessels

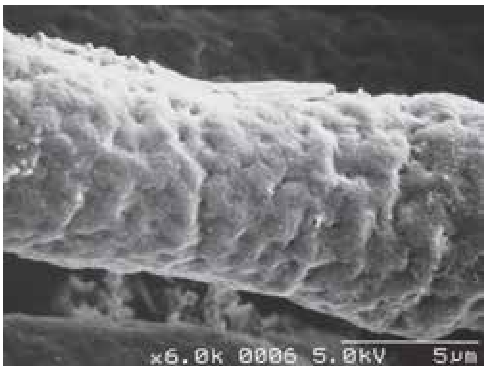
Sputter coating takes about three minutes to deposit enough Au on a structured sample. Therefore, samples get shrunk and damaged by heat. The deposit on the surface is thicker than necessary which makes the surface swollen, and it is impossible to see the original surface structure.

Os coating only takes 20 s and deposits an ultrathin film that prevents charging and shows no heat damage. The actual surface structure remains visible at high magnifications.

Os Coat (20 sec)

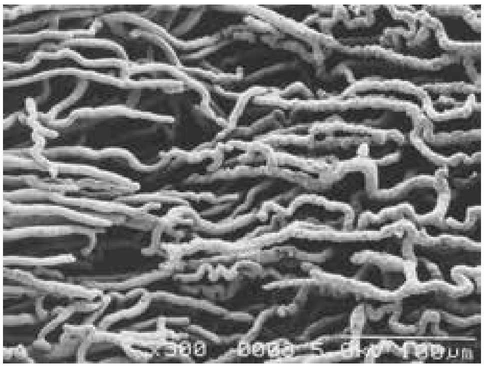


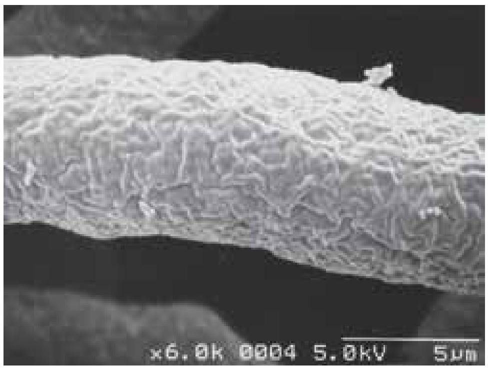
Acceleration Voltage: 5kV
Magnification: x300



Acceleration Voltage: 5kV
Magnification: x6.000

Au Coat (3 min)


Acceleration Voltage: 5kV
Magnification: x300



Acceleration Voltage: 5kV
Magnification: x6.000

	Current Value	Coating Time
Neoc (Tennant20 predecessor)	**5 - 10mA**	**5 - 20 sec**
Sputter Coat	30 - 50mA	30 - 180 sec

Dataprovided by Okayama University, Dental School of Medicine, Human Morphology

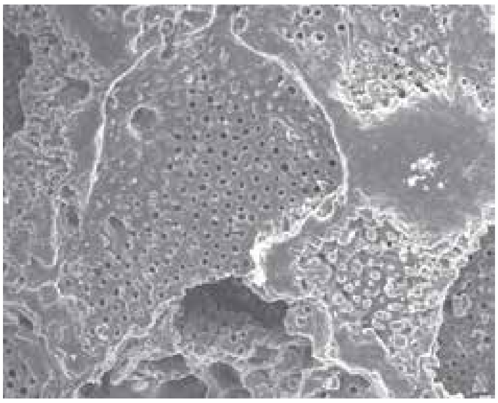
Observations and Measurements

Fully Coating

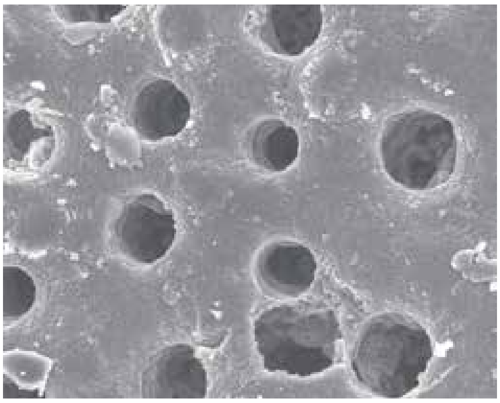
Star Sands

Star sands consist of mainly calcareous matters and the surface is porous. The surface asperity is eliminated by sputter coat at a high magnification, and it is hard to observe the minute structure. The x10.000 image shows further details of the holes on the surface in the image at a magnification of x950.

Data provided by JEOL Ltd.



Magnification: x950



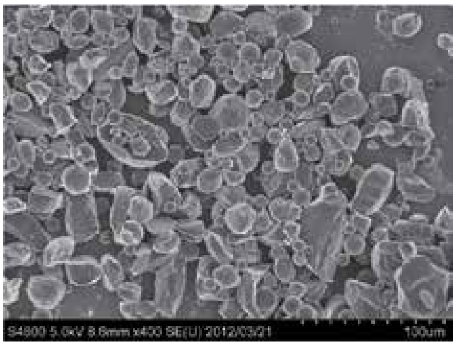
Magnification: x10.000

No Charge-up on Overlapped Samples

Polystyrene Particles

Charging especially in the overlapping area of non-conductive particles is a common problem. It is impossible to image at magnifications of more than x2.000 in this example with a sputtered Pt coating.
Os-coating in contrast provided a clear image even at x5.000 magnification. Fine dents and structures that originate from the production of the particles become visible. Charging does not occur in the overlapping area. A sharp, high-contrast image can be captured.

Os Coat (5nm)

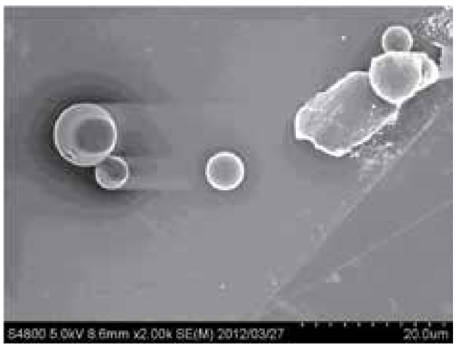


Acceleration Voltage: 5kV
Magnification: x400

Acceleration Voltage: 5kV
Magnification: x5.000

Pt Coat (6nm)

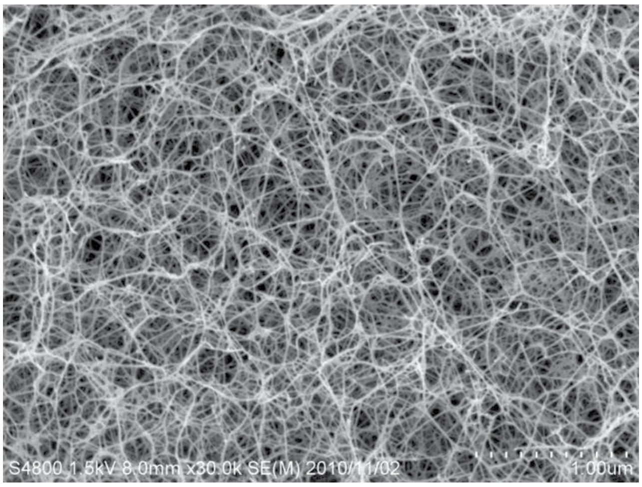
Acceleration Voltage: 5kV
Magnification: x400



Acceleration Voltage: 5kV
Magnification: x2.000

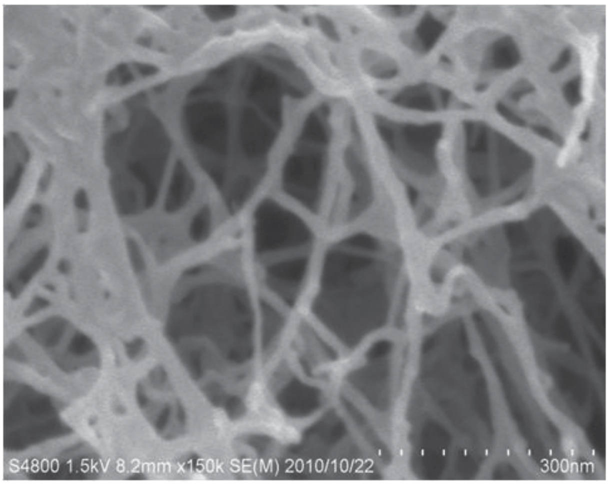
Data provided by Prof. Hiroyuki MUTO,Toyohashi University of Technology, Electronic Materials Course

Os Coat



Magnification: x30.000

Os Coat



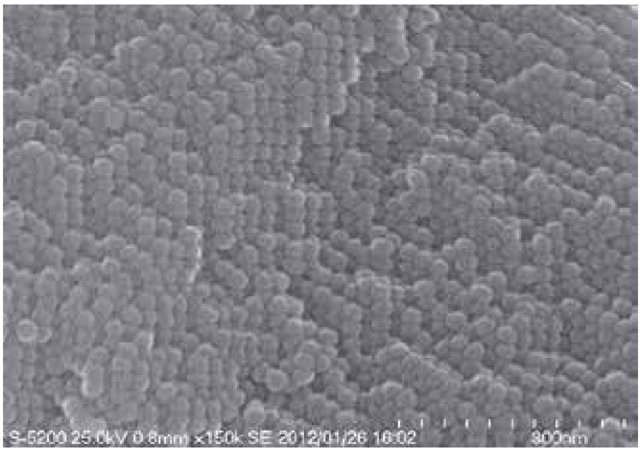
Magnification: x150.000

Thick Layer of Fibers

Cellulose Nanofibers

In this example it was difficult to see nanofibers without damaging fine fibers. With Os-coating the details of nanofibers can be observed at nano level as they are fully coated.

Data provided by Mr. Seung-Hwan LEE, National Institute of Advanced Industrial Science and Technology, Biomass Research Center



Os Coat

Magnification: x150.000

Au Coat

Magnification: x90.000

Clear Particle Distinction and No Granularity

Silica Nanoparticles

It was hard to distinguish between silica nanoparticles and sputtered Au. An Os-coating gives a clear SEM image without charging and no visible granularity at a magnification of 150.000x.

Data provided by Mr. Daisuke Kawaguchi, Nagoya University, Depa rtment of Applied Chemistry, School of Engineering

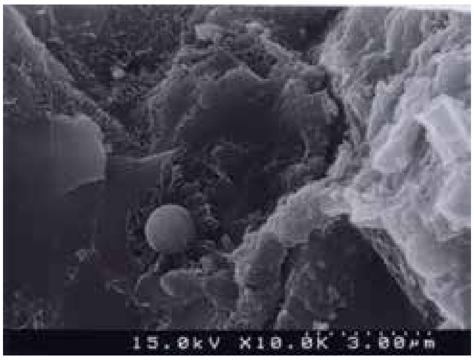
Observations and Measurements

No Granularity on Uneven Samples

Coal Ashes

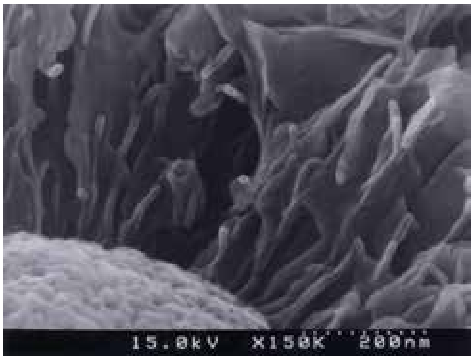
These images capture coal ashes increment. No charge-up occurs on highly uneven samples. A clean surface structure can be observed without granularity at a high magnification of x150.000.

Os Coat



Magnification: x10.000

Os Coat



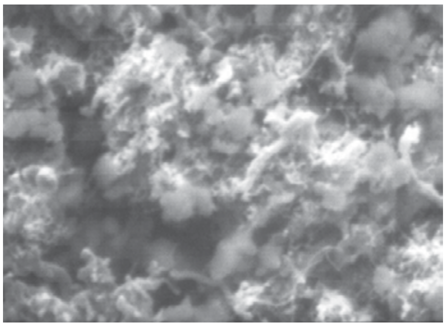
Magnification: x150.000

Reinforced Film Allows High Resolution

Carbon Nanotube

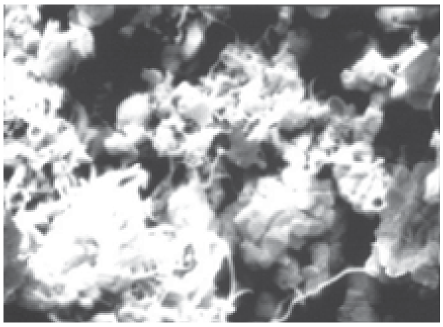
Even carbon nanotubes with unstable shape can be observed at high resolution when coated with Os. Os-coating provides a reinforced film.
When CNT are observed by SEM without coating, they can cause contamination on the SEM detector as charging effects can cause movement during observation. Os coating prevents charging, drift and contamination.

Uncoated



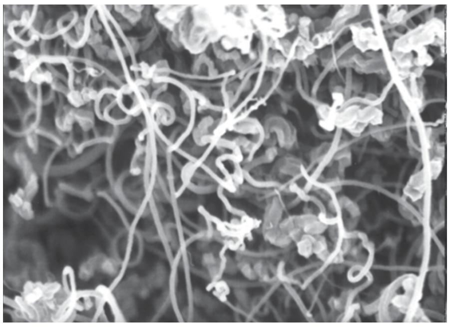
Magnification: x20.000

Au Coat



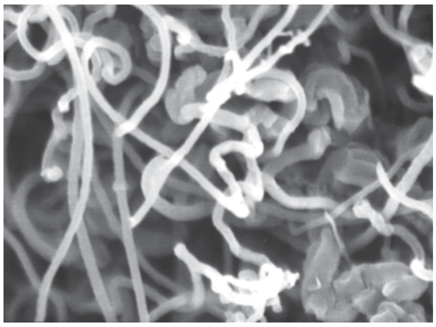
Magnification: x20.000

Os Coat



Magnification: x20.000

Os Coat



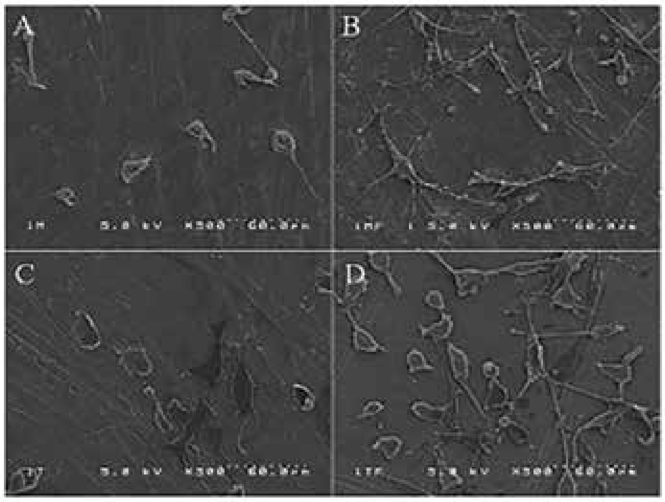
Magnification: x40.000

Data provided by Prof. Hiroyuki MUTO, Toyohashi University of Technology, Electronic Materials Course

Titanium Surface Treatment For SEM Preparation

Implant Body Titanium

Most dental implants are made of titanium. Their surfaces are polished by sand blasting, acid-etching or hydroxyapatite coating. The contact area of an implant body with the surrounding bone gets larger by treating the surface. The fine structure and the chemical composition of the Ti surface can increase the adhesion, the growth of cells and enhance bone formation.
The Neoc Os-coater was used before SEM preparation after Ti surface treatment at the Nippon Dental University. The image on the right is an SEM image of a Ti surface functionalized by H2O2 hydrothermal oxidation and FGF-2 treatment. The image was taken 24 hours after cell seeding. The pseudopods of the cells are intact and you can see the cell adhesion.



Magnification: x500

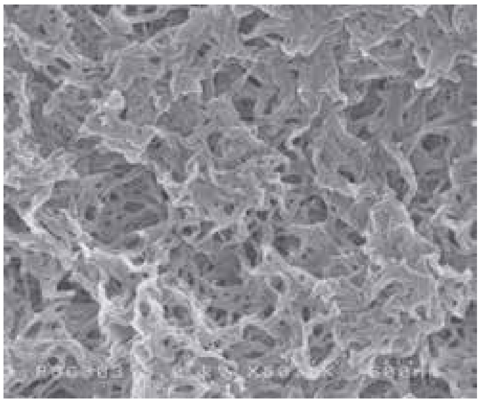
Data provided by Associate Prof. Tomonori Matsuno

Clearer Image At Low Magnification

Sepharose

Sepharose is a type of polymer beads with a porous surface. It is used mainly for adsorption of proteins and microorganisms.
A clear image can be captured at low magnification and the details can be seen at a high magnification without charging.

Magnification: x2.500



Magnification: x50.000

Observations and Measurements

No Damage to Plant Samples

Azalea Pollen

Compared to the uncoated sample, the surface structure of the Os-coated pollen can be clearly observed without blurring. As Os-coating does not cause heat damage, even the sticky threads of azalea are still intact.

Os Coat

Magnification: x1.700

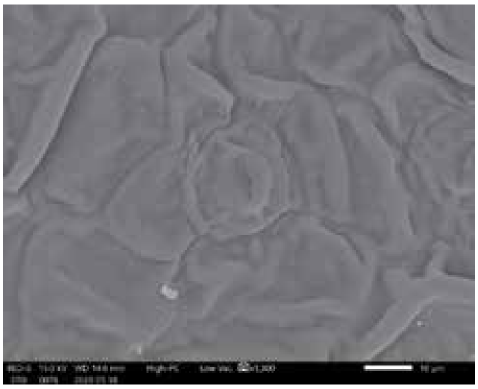
Uncoated

Magnification: x1.700

Azalea Stoma

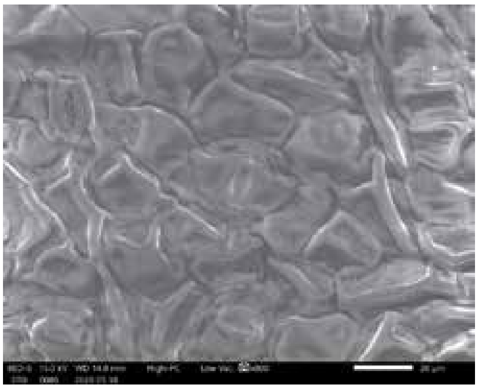
Observing the underside of an azalea leaf, stomata of the Os-coated sample can be clearly seen even at a high magnification of x1.300. Charging occurs on the uncoated sample at a magnification of x800.

Os Coat



Magnification: x1.300

Uncoated

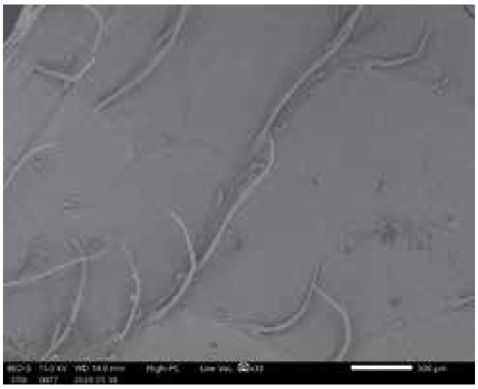


Magnification: x800

Azalea Trichome

The image of an uncoated azalea leaf is blurred even at low magnification. However, with Os coating you can see the detailed trichome structure.

Os Coat



Magnification: x33

Uncoated

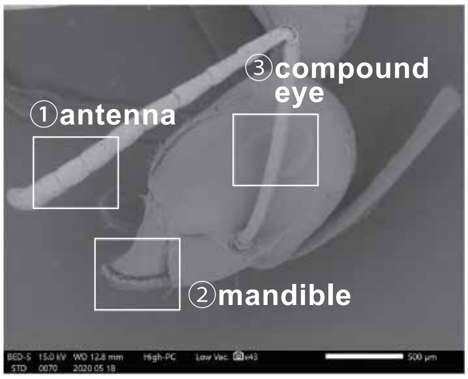
Magnification: x33

Clear and Detailed Observations

Ant

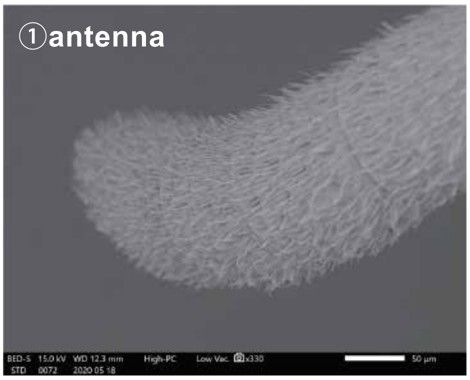
The surface structure, the shape and the texture of an ant antenna can be easily observed.

Os Coat



Magnification: x43

Os Coat



Magnification: x330

Rosemary Leaf

Os coating provides a clearer image which captures the surface structure of the leaf and the inner fluffy area in detail.

Os Coat

Magnification: x100

Os Coat

Magnification: x600

Uncoated

Magnification: x100

Uncoated

Magnification: x600

Observations and Measurements

Intact Fiber Structures

Fibrous Materials

Here some fibrous materials observed at a low magnification.
Looking at the images of pulp fiber like Kim Wipes, Kimtowel, copier paper, chemical fiber BEMCOT CLEAN WIPE, BEMCOT M-1 and wet wipes, the different fine structures can be seen.

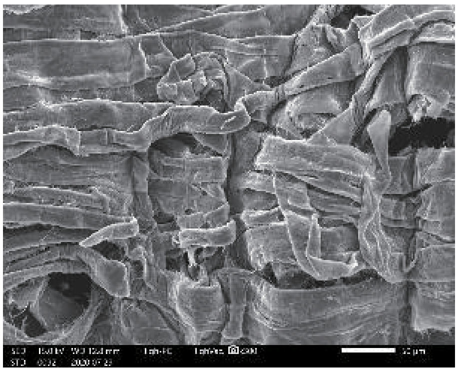
Made of the same material, KimWipes and Kimtowel have a different three-dimensional structure and BEMCOT CLEAN WIPE and BEMCOT M-1 have different weaves.

You can see some fibers partially woven into wet wipes for absorbing water and the loading materials such as calcium and silicon powder on the copier paper.

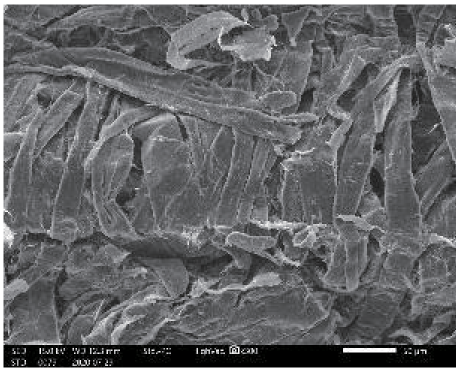
Images were taken with a bench-top SEM with automatic focus at a magnification of x300 and x5.000.

Os Coat (x300)

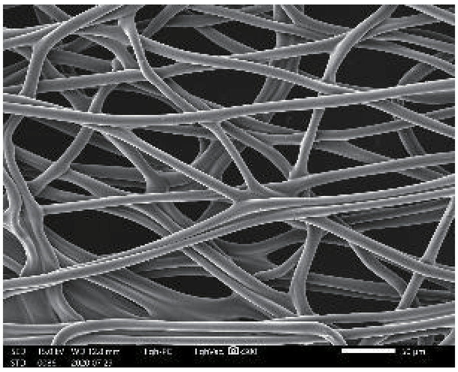
KimWipes



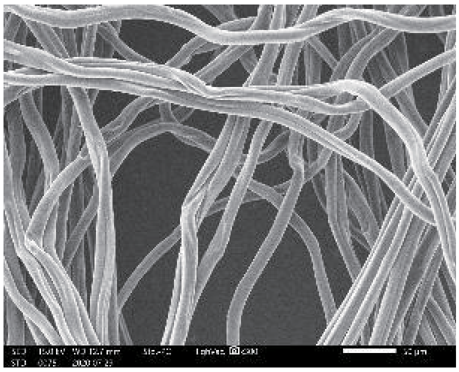
Kimtowel



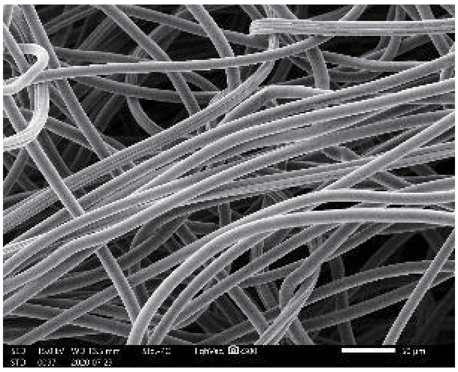
BEMCOT CLEAN WIPE



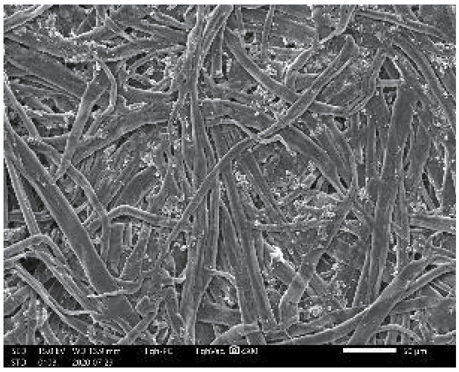
BEMCOT M-1



wet wipes

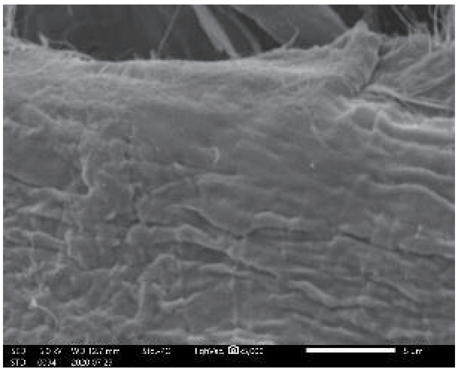


copier paper

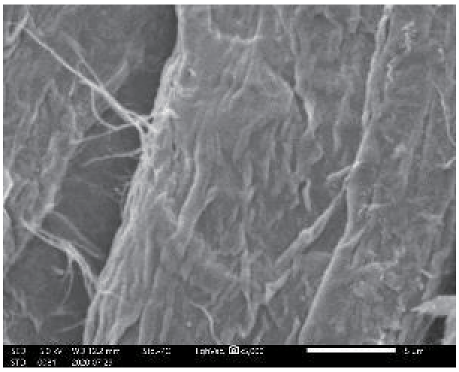


Os Coat (x5.000)

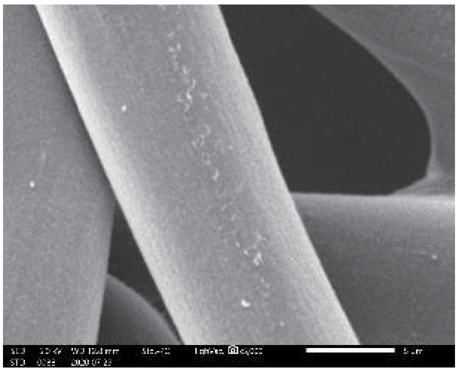
KimWipes



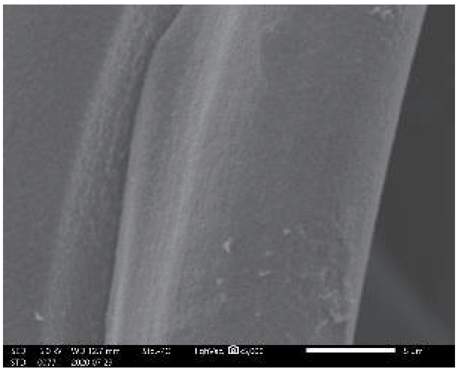
Kimtowel



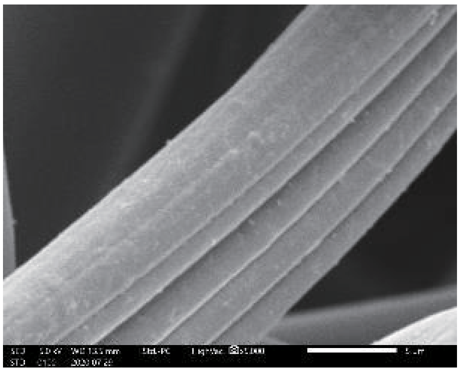
BEMCOT CLEAN WIPE



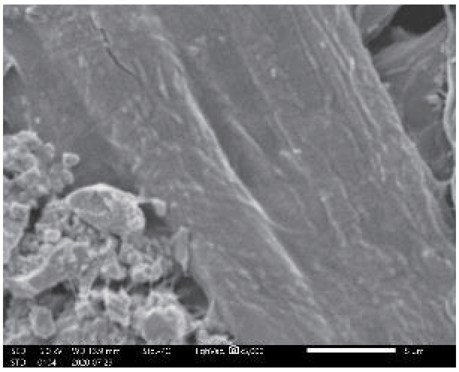
BEMCOT M-1



wet wipes



copier paper



Options and Safety Measures

Sublimation Cylinder Options

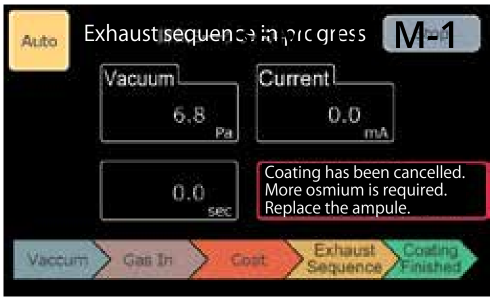
There are two options for sublimation cylinders: The easy-to-use metal sublimation cylinder or the double wall glass sublimation cylinder to see the Os-ampule whenever you need to check the condition.

Commercially available Osmium ampules e.g. manufactured by EMS are suitable for the Tennant20 coating system.
Ampules of 500 mg or 1000 mg (1g) are usually used for stable gas emission characteristics.

Double-glass Double Sealing | Metal | Os Ampule 500mg 1000mg (1g)

Auto Notice For Ampule Replacement

You will get a notice on the screen when the Os ampule needs replacing.
Just follow the instructions to replace the ampule. The process is easy.

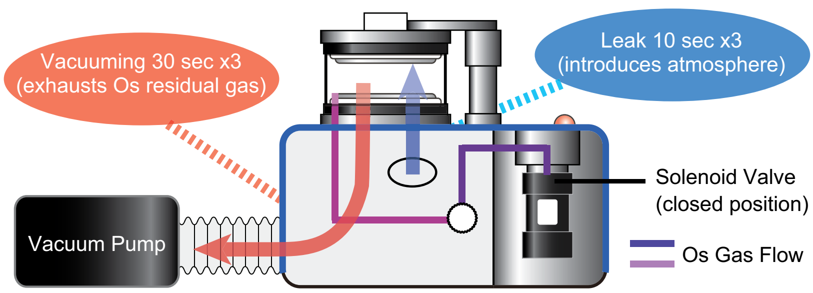


Passcode Limits Users

A passcode is required for safe use and management of the coater. By entering your passcode, the operation log will be recorded automatically.

Auto Exhaust Sequence Reminds Replacement Work

The chamber is flushed with an exhaust sequence that automatically replaces the Os residual gas in the chamber with air. Samples can be removed safely.



Solenoid Valve Designed For Os Gas

A two-way solenoid valve is mounted between the sublimation cylinder and the chamber.
The valve closes automatically in the event of a power failure.

Vacuum Holding Function During Power OFF

The chamber can be kept under vacuum when the system is switched off.

OFF

Tennant20 Features

Automatic Exhaust	Gas replacement in chamber (vacuum drawing 30 sec/ pump stop 10 sec x3)
Current Value Setting	0.1 ~ 20.0mA (Maximum current limit: 30mA)
Film Thickness Auto	0.0 ~ 30.0nm Automatic vacuuming after entering thickness value: ~ 2Pa Gas filling : 10 sec
Manual	Arbitrary setting of COAT Time, current value and gas filling time
EJECT	Forced exhaust : 180 sec
INSERT	Forced exhaust : ~ 2Pa
Finish	Forced exhaust : ~ 2Pa
Ampule Replacement	Forced exhaust : ~ 2Pa + 30min

Tennant20/ Neoc Series

Model	Tennant20 NEW	Neoc-Pro/P (Japan only)
Chamber Dimensions	Ø150×70mm	
Sample Stage / Capacity	Ø105mm Ø10mm×35, Ø15mm×10, Ø30mm×5	
Touch Screen	✓	o
Vacuum Holding Function During OFF	✓	o
Sublimation Cylinder Open/close Detection	✓	
Automatic Exhaust Sequence	✓	
Vacuum Pump Volume	3m³/h (50l/min) two stage rotary pump	
Power Requirements	AC 230V/max. 5A / 100V/max. 10A (incl. vacuum pump start-up)	
Max Power Consumption	780W	600W
Weight	22kg	16kg
Dimensions of Main Unit	390(W) x 385(D) x 435(H)mm	340(H) x 280(D) x 400(H)mm

Full Customer Support

We are committed to providing the highest level of customer service and support.

Please feel free to contact us.

SCIENCE SERVICES

Your Partner for Microscopy and Lab Supplies

Contact Information

Science Services GmbH
Unterhachinger Str. 75 ▪ 81737 Munich, Germany
+49 (0)89 18 93 668 13 ▪ Tech@ScienceServices.de ▪ ScienceServices.de

Note : Design and specifications are subject to change without notice.