Safety Features

Handle Osmium Tetroxide Safely

Ampules containing osmium tetroxide are designed to safely break in the sublimation cylinder. The concentration of osmium tetroxide exhausted from the vacuum pump is below the industry safety standards, which is proven by ICP-MS.

Easy Maintenance

Detachable electrodes and glass bell jar make cleaning easy.

Specially Designed for Easy Use and Safety

Multilayer Sealed Sublimation Cylinder

- A whole osmium tetroxide ampule can be set in the sublimation cylinder.
- The multilayer sealed sublimation cylinder completely prevents the leak of osmium tetroxide.
- Sublimation cylinders containing osmium can be safely stored in the freezer after each use.

Specifications

Model	Neoc-Pro	Neoc-STB	Neoc-ST
Chamber Size	Diam. 150 x 70mm		
Max. # of Stubs	Diam. 15mm x 7		
	Diam. 10mm x 35		
Buffle Valve	No	Yes	No
Pump Capacity	50L/min		
Current Consumption	Max 10A (Incl. current at starting rotary vacuum pump)		
Power Supply	AC100V		
External Dimensions	340(W) x 280(D) x 400(H)mm		

Note: Specifications are subject to change without prior notice.

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NEOC

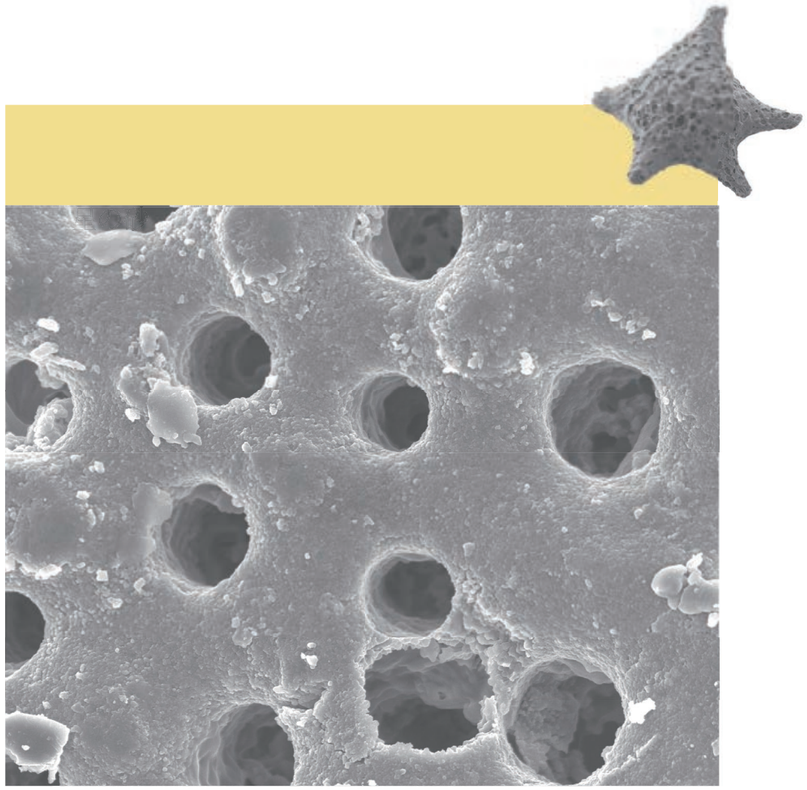
Neo Osmium Coater

MEIWAFOSIS CO., LTD.

Ideal Coating Solution for SEM Observation and More!

x 100K
Electron Beam Resistant

Discover New Features of Your Samples



Sand Star 5kV x 10,000

The image is provided by JEOL Ltd.

Development Concept

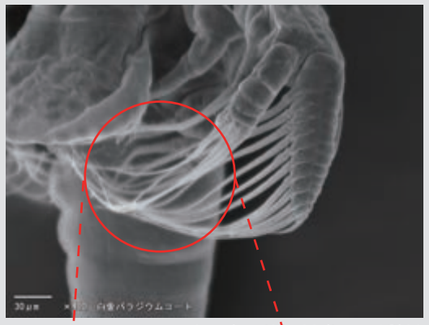
Meiwafosis Co., Ltd. has been seeking a better solution for sample observations. The Neoc-Neo Osmium Coater- is an innovative instrument which fully covers a sample with highly pure osmium in its large negative glow discharge region. With our own discharge conditions, you will be able to see the true structures of your samples.

Comparison Between Sputter Coater and Neoc

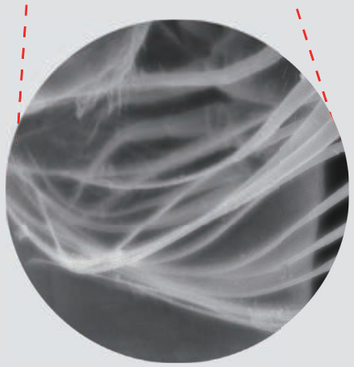
Artemia salina larvae were freeze-dried and coated by a sputter coater and the Neoc. The images below show the difference. The one coated by the Neoc clearly reveals more details.

Sputter Coater (Platinum Palladium)

(Coating Time: 20 sec)



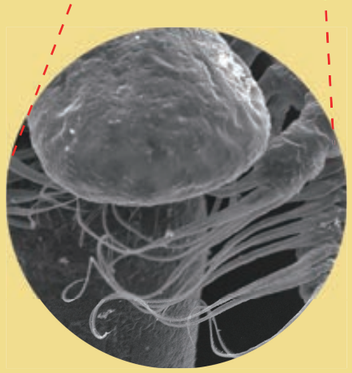
Accelerating Voltage 10kV



Neoc (Osmium Tetroxide)

(Coating Time: 20 sec)

Accelerating Voltage 10kV



The complicated surface is fully covered with osmium. No charge-up is seen.

The photos provided by Dr. Masaki Ueno (School of Allied Health Sciences, Kitazato University)

Uniform Coating

The Neoc is suitable for samples which have asperate surfaces and sophisticated structures such as replicas of blood capillaries, polymer fibers and powders.

Osmium gas uniformly surrounds samples and deposits a thin metal film in a few seconds. Smooth and even layers are formed across the sample surface.

No Granularity

Since osmium tetroxide has an amorphous property, no granularity is recognized over osmium coated sample surfaces, even on highly magnified SEM observations.

No Charge-up

Pure osmium has good conductivity and high secondary electron emission efficiency. Thin and even osmium layers prevent charge-up generated by electron beams.

No Heat Damage

The main problem of conventional methods such as sputter coaters and resistance heating methods is heat damage to samples. The Neoc can be operated at a low voltage and it gently covers a sample surface with osmium in the gaseous state in a very short time. It does not cause any heat damage.

With the specially designed electrodes and the configurations of the electronics, we succeeded in reducing a large amount of impressed current per unit area. Even chocolate can be coated by the Neoc without melting.

No Electron Beam Damage

Osmium gas created in the negative glow discharge region is highly pure, and it provides excellent conductivity and heat resistance. It protects samples from strong electron beams of SEM at high magnification.

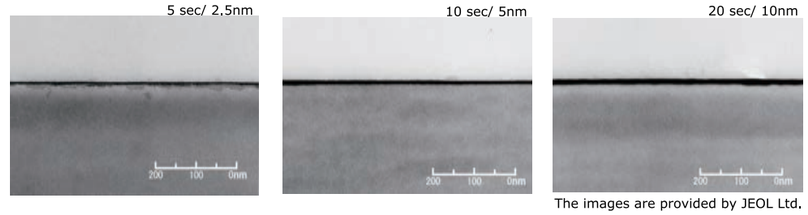
Maximum Strength with Minimal Thickness

Film Thicknesses of Amorphous Os

Uniform Coating No Heat Damage

The TEM images show different film thicknesses on plastic coated by the Neoc.
Deposition Condition: 10mA, 7Pa

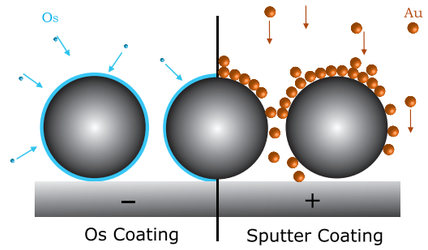
Time	Thickness
5 sec	2.5nm
10 sec	5nm
20 sec	10nm



The images are provided by JEOL Ltd.

Coating Conditions

No Charge Up No Granularity



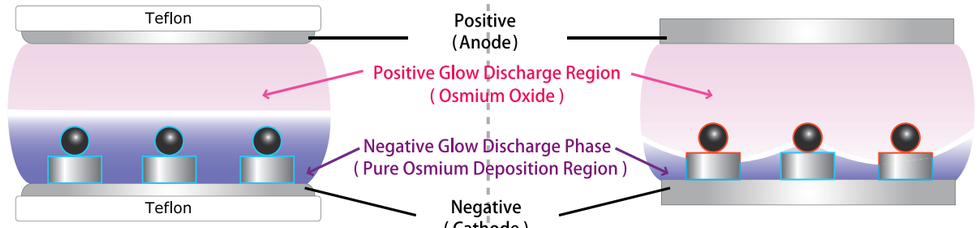
Newly Developed Electrodes Provide Highly Pure Osmium Layer and Wider Negative Glow Discharge Phase

Neoc Electrodes:

***Negative glow charge phase is 20 mm high from the surface of the cathode**
***Uniform layer coating is guaranteed**

Conventional Electrodes:
*Negative glow charge phase is only 5 mm high from the surface of the cathode
*Samples higher than 5 mm are partly affected by positive glow discharge, and as a result, osmium oxide layers are formed

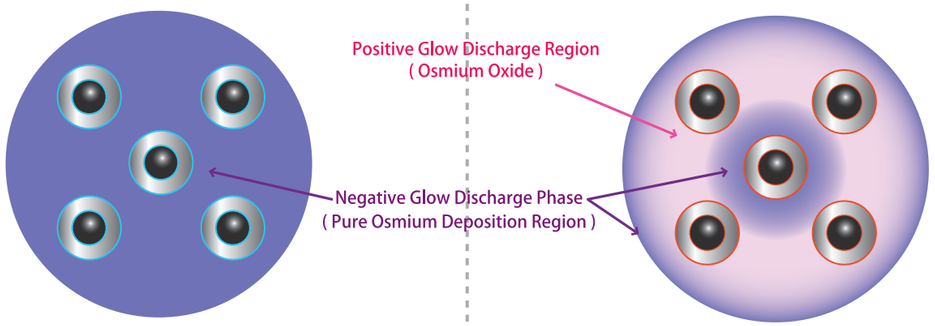
Heights of Negative Glow Discharge Phases



20mm High: Uniform

5mm High: Non-uniform

Areas of Negative Glow Discharge Phases



Large Pure Osmium Coating Area

Limited Negative Glow Discharge Area
(Covers only 30%)

Customers' Comments

Application Case 1: AFM Cantilever

"Osmium Coating Strengthens Cantilevers!"

The tips of SPM/AFM cantilevers are applied with 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, cantilevers coated by the Neoc are much more resistant to damage caused during measurement. These cantilevers can be reused after cleaning and recoating with osmium, and repeatability is still high. It saves a lot of cost. I would like to recommend this coating procedure to AFM users.

Dr. Toru Nakamura
(Advanced Industrial Science and Technology)

SEM Image of AFM Cantilever Tip

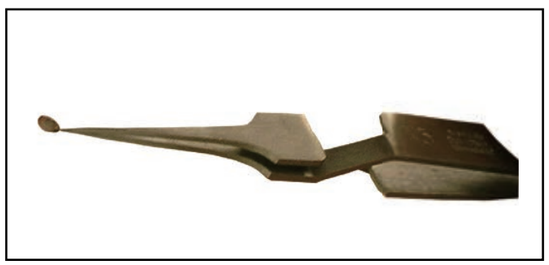
Application Case 2: TEM Grid Support Film

"Pure Osmium Coating is the Best Solution for Sample Support Films."

Support films are used when fine particles such as powders and dusts are observed by TEM. Typically, support films are made of collodion or carbon. However, pure osmium has caught a lot of attention recently as it can form a thin but strong film. The properties below make osmium suitable for TEM observation:

1) Strong against electron beams
2) Able to form support films without winkles on a surface
3) Able to evenly cover a sample

It solves sample drifting issues as well.



TEM Grid Support Film

Customers' Comments

Application Case 3: Nanofibers (Assembled Pigment Molecules)

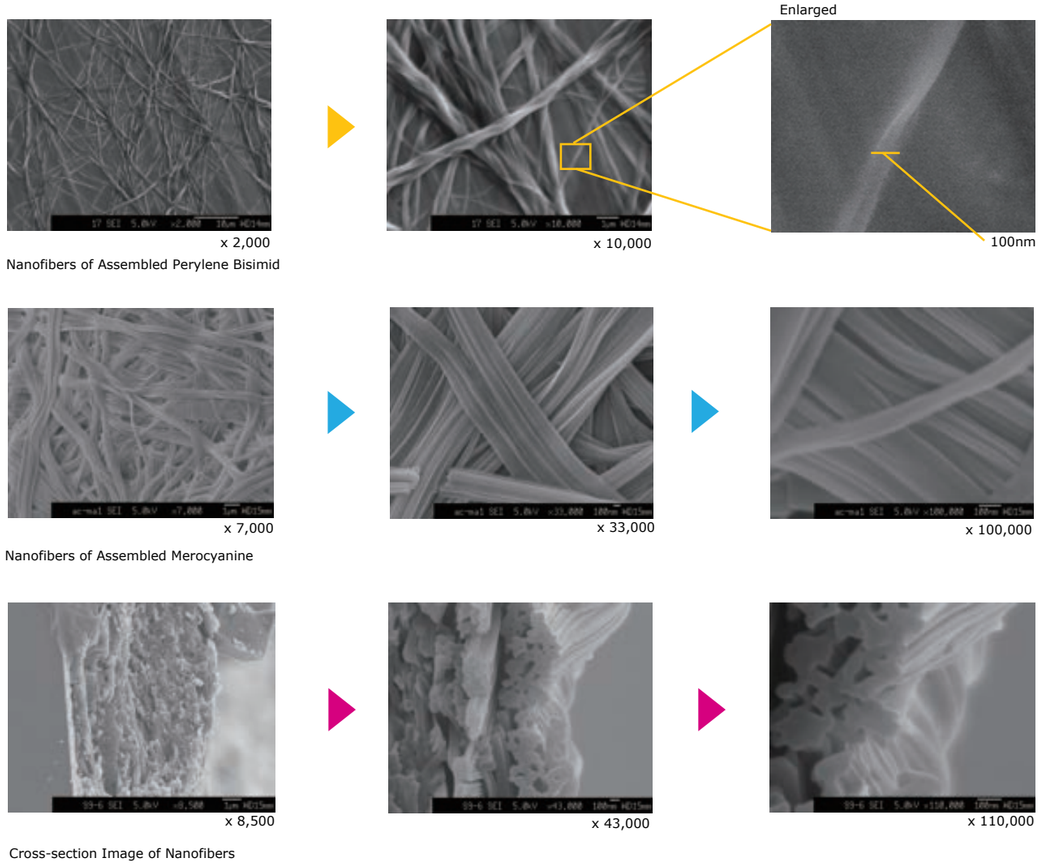
"After Coated by Neoc, Nanofibers Reveal More Details on Nano Scale."

The SEM images below are nanofibers that resulted from various self-assembled pigment molecules such as merocyanine, perylene bisimide and etc. These nanofibers are spontaneously formed at normal temperature under normal pressure in a certain period of time after accurately designed pigment molecules are dissolved in a solvent.

These pigments self-assemble in three phases (molecule, nano, and micro levels). By traditional coating methods, observations at high magnification are difficult due to granularity and poor quality of conductive films. Furthermore, nanofibers made of pigment molecules are susceptible to heat, and easily deformed by electron beams. Charge-up has been an issue.

The Neoc enables me to observe nanofibers in fine detail at high magnification. Seemingly one fiber turned out to be a collection of fine fibers (100 nm). Nanofibers are expected to be utilized as optical/electronic materials made from organic materials in the future.

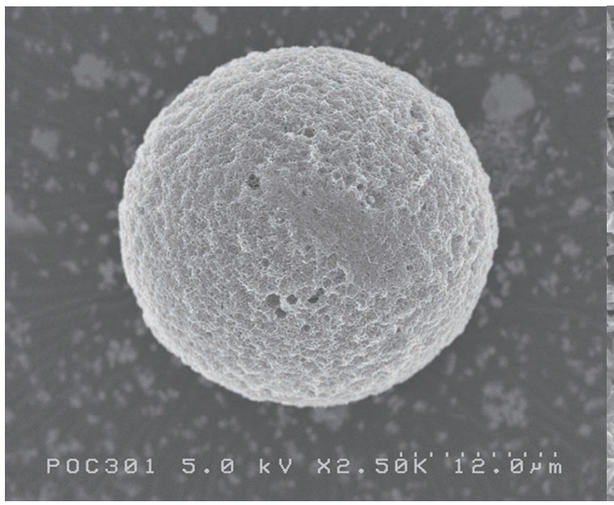
Dr. Fumiki Yagai (Chiba University)



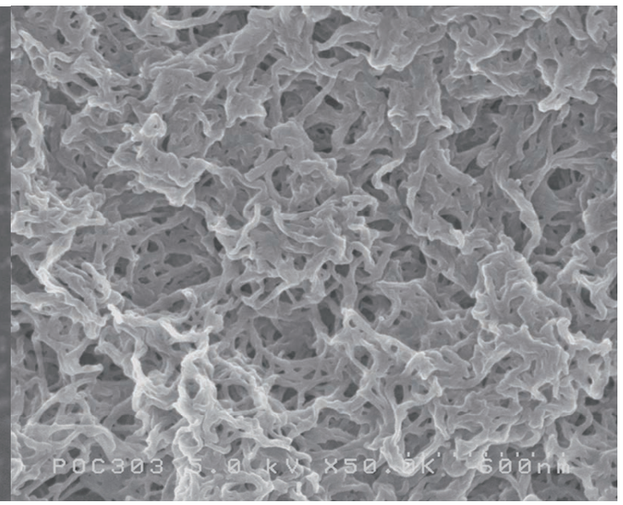
EM Images of Various Samples Coated by Neoc

Sepharose

Sepharose is a type of polymer beads and used for adsorption of biological samples such as proteins and microorganisms. The images below show porous structures on the surface.



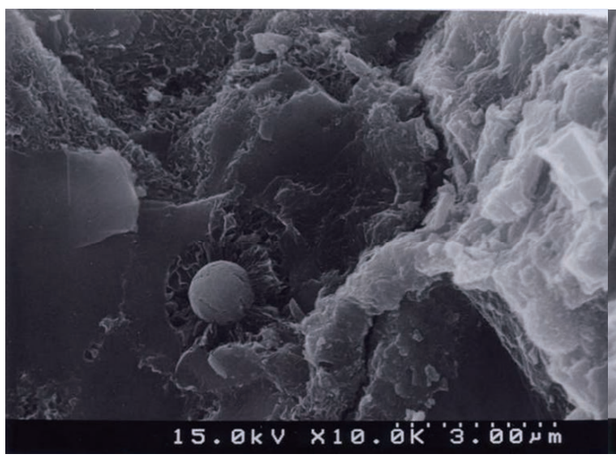
x 2,500



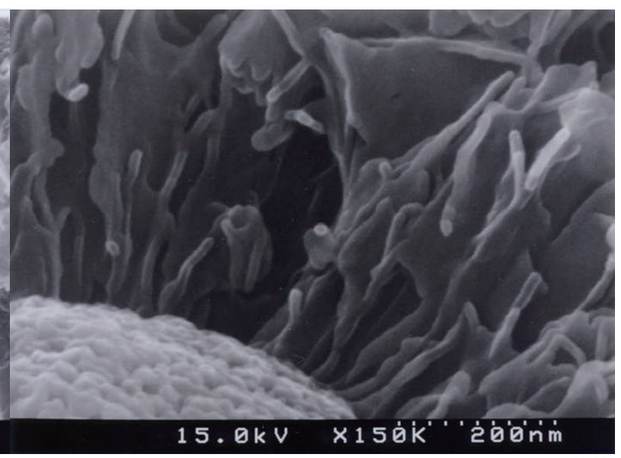
x 50,000

Coal Ash

The sample below is coal ash in cement materials. It has an extremely uneven surface. However, with osmium coating, you can surely see the details. No charge-up is seen even at 150K magnification.



x 10,000

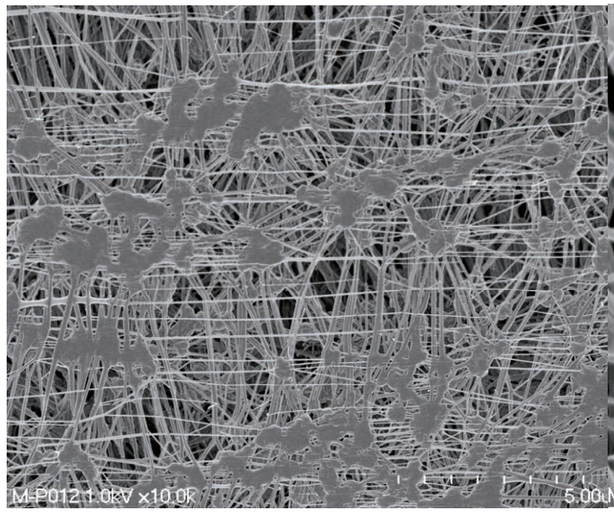


x 150,000

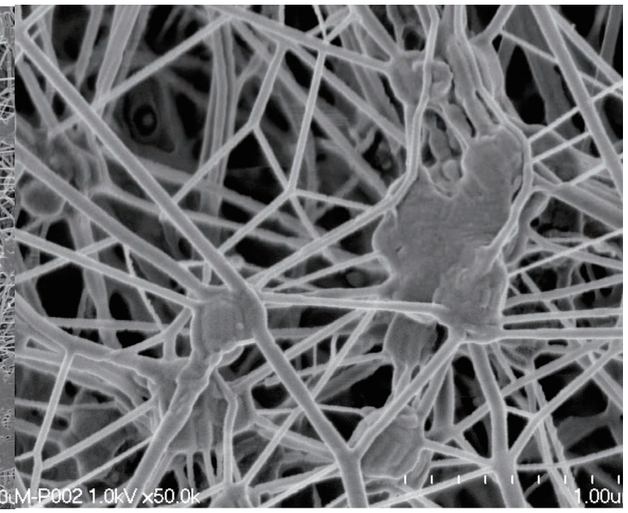
EM Images of Various Samples Coated by Neoc

Membrane Filters

Membrane filters are easily damaged by heat. But the Neoc causes no heat damage to them.



x 10,000



x 50,000

Wolf Skin Hair

The images below show wolf skin hair. No heat damage is seen on the sample. These frayed fine hairs are susceptible to heat. Sputter coating causes this type of samples to get frizzled.

x 1,000

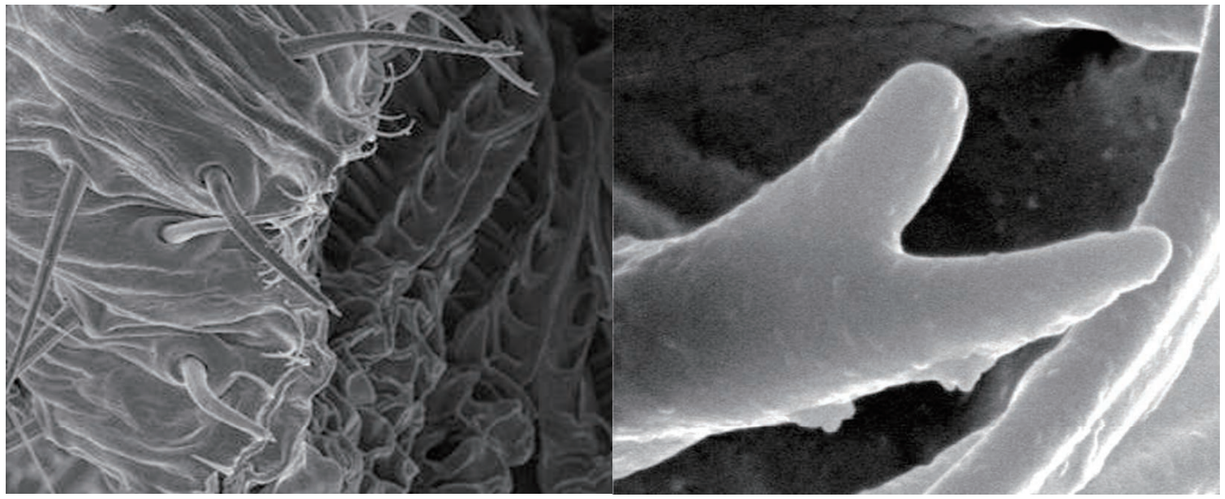
x 5,000

EM Images of Various Samples Coated by Neoc

Drosophila

No damage is seen in the images below even at 100K magnification. Such complicated samples can be observed without granularity and heat damage.

Head x1,000

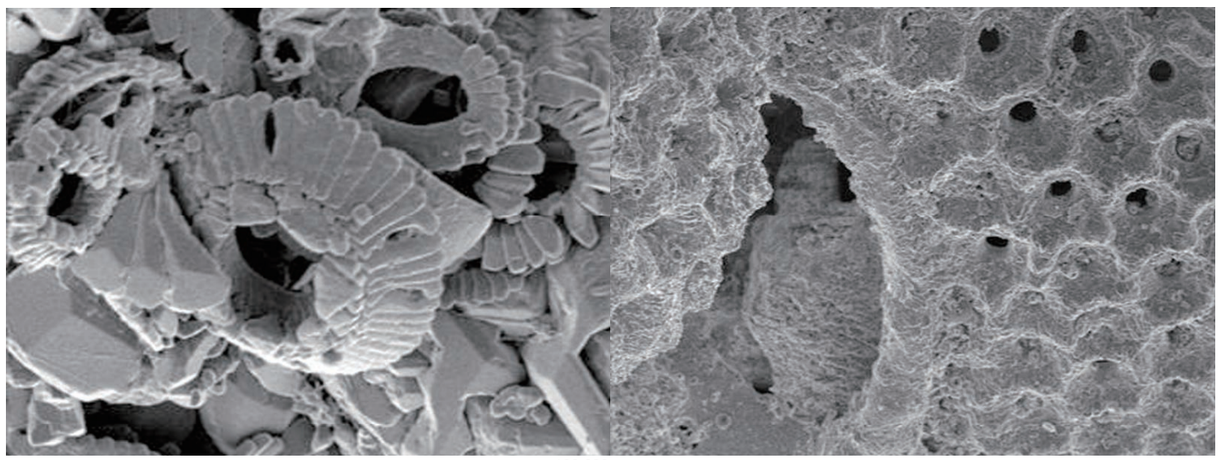


Antenna x 10,000

Antenna x 100,000

Fossils

Highly porous samples such as fossils can be clearly observed in detail.



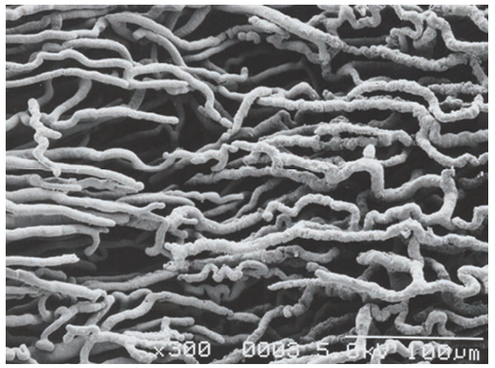
x 100,000

x 50,000

Difference Between Gold Sputter and Neoc

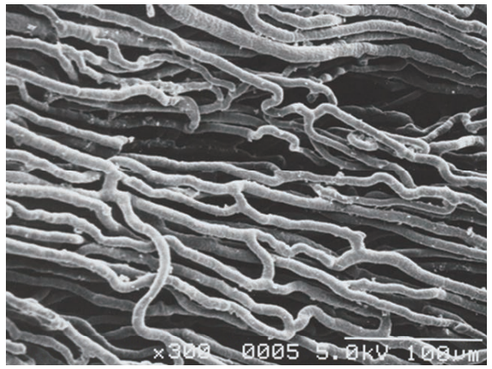
Replicas of Rat Cardiac Blood Vessels

Au Sputter



Au Coating 3 min
Accelerating Volatge 5kV
x 300

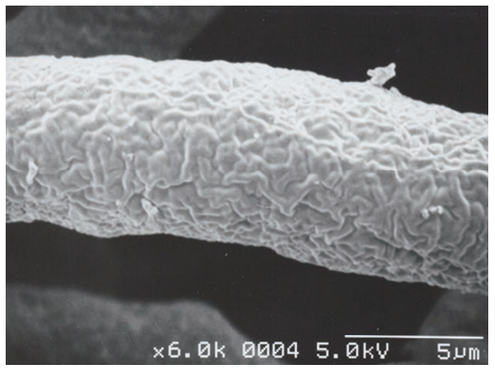
Neoc



Os Coating 20 sec
Accelerating Volatge 5kV
x 300

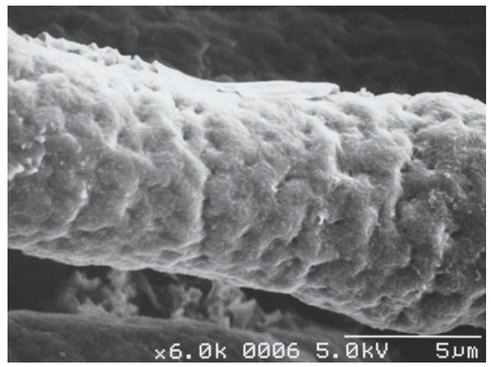
In order to prevent charge-up, sputter coating needs three minutes to deposit Au on a complicated sample such as replicas of rat cardiac blood vessels. Therefore, samples get shrunk and damaged by heat. Its thick coating makes samples swollen. In contrast, coating by the Neoc only takes 20 seconds. It can form a thin film on a sample without charge-up and reveal the original structure in detail.

Au Sputter



Au Coating 3 min
Accelerating Volatge 5kV
x 6,000

Neoc



Os Coating 20 sec
Accelerating Volatge 5kV
x 6,000

These are 6K magnified images of replicas of rat cardiac blood vessels. The surface of the Au coated sample is damaged by heat. The difference between sputter and Neoc coating is obvious.

Images Provided by Dental School of Medicine, Okayama University