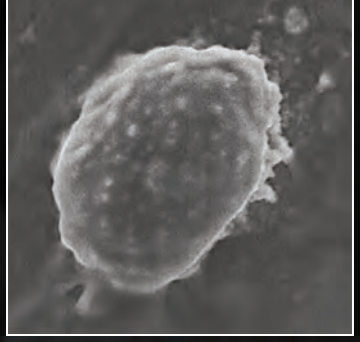
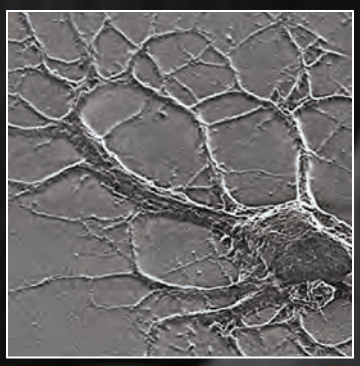
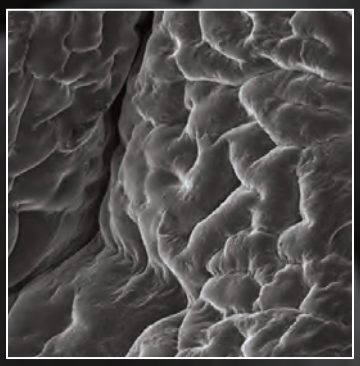
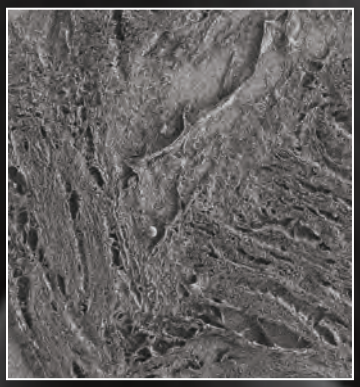






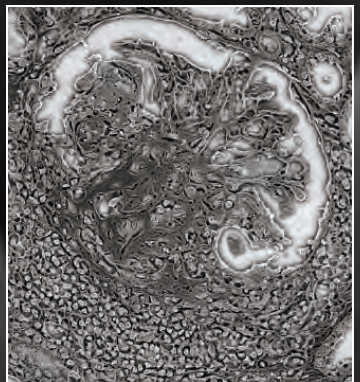


SEM imaging of biological objects
in their natural state

NanoSuit®

Aqueous Solution for SEM

Electron
Microscopy
Sciences



SEM imaging of biological objects in their natural state

NanoSuit® Aqueous Solution for SEM

Fine detail of undamaged flower petal structure is easily observable.

History

Inventor Professor Takahiko Hariyama tried to observe various microorganisms using SEM, but almost all organisms died due to moisture loss under the vacuum conditions of electron microscopy.

However, he discovered a kind of fly larva was able to stay alive under the vacuum condition.

Prof. Hariyama investigated that phenomenon and revealed that a very thin barrier layer was formed on the surface of the larva by electron beam irradiation. The barrier layer held moisture and kept the larva alive.

Hariyama and his colleagues tried to mimic this phenomenon artificially and invented "NanoSuit" technology.

What is NanoSuit?

Nanosuit is a novel technology which enables us to observe cells, microorganisms, etc. in a living state using scanning electron microscopy (SEM).

NanoSuit forms a very thin barrier layer on the surface of an object and the barrier layer holds moisture in the object under vacuum condition in electron microscopy. Also, the barrier layer is electrically conductive.

Therefore, NanoSuit makes it possible to observe biological objects with their natural image texture.

NanoSuit is very easy to use. Simply drop the NanoSuit solution onto the objects, then you can observe the objects using SEM. (You don't need any other fixation procedures.)

The science behind the "NanoSuit"

- Just drop the NanoSuit Aqueous Solution of the biocompatible polymer (biologically safe material) onto your specimen
- Polymerize by electron beam or plasma irradiation. A thin barrier layer is formed on the surface of your specimen.
- The barrier layer keeps moisture contained in the subject and its conductivity provides clear SEM images.

Larva insulated from the effects of vacuum.

Dehydrated larva under vacuum.

Fixed Drying Process

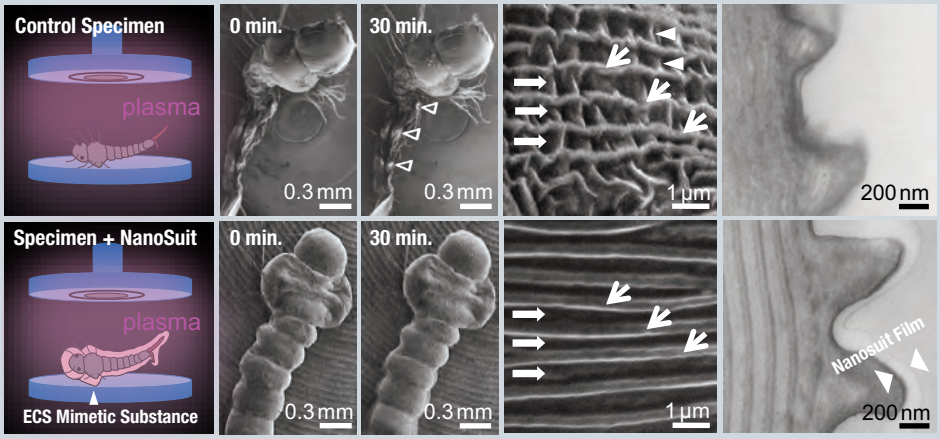
Currently used by many researchers, this process results in dehydration and deformation of biological specimens caused by the vacuum condition inherent to EM.

Origin of NanoSuit

NanoSuit was created to mimic the mucus layer of larva of Drosophila, which showed the ability to insulate specimens from the effects of vacuum when irradiated by plasma.

Molecularly Bonded Protective Layer

TEM observation shows the self-supportive layer. Tissues and cultured cells can also be observed in a natural state using this innovative solution.



Without any treatment, the larva dehydrates and collapses under vacuum. The bottom micrographs show that its shape and structure is maintained with the use of the NanoSuit method. On the bottom right micrograph, you can see a NanoSuit film has formed on the surface.

Electron Microscopy Sciences

NanoSuit®

Aqueous Solution for SEM

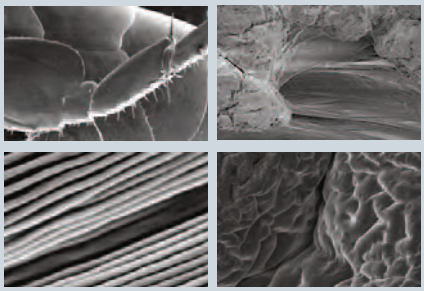
Selection Guide

NanoSuit Aqueous Solution is available in three types. Refer to the chart below to select the formulation which suits your application. Please visit our website for instructional video and Technical Data Sheets relating to the protocols suggested for using NanoSuit in the lab.

NanoSuit Solution I

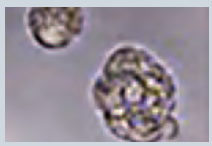
for micro-organisms/ living tissue/materials

- small animals
- plants
- food
- chemicals



Spheroids/Organoids

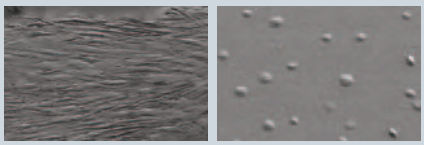
may be applicable by diluting NanoSuit Solution I with water, or by using NanoSuit Solution III



NanoSuit Solution III

for cells

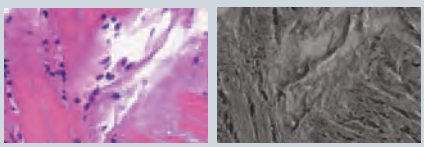
- bacteria
- liposomes
- exosomes
- viruses



NanoSuit Solution II

for CLEM

only for paraffin-fixed pathological section specimens

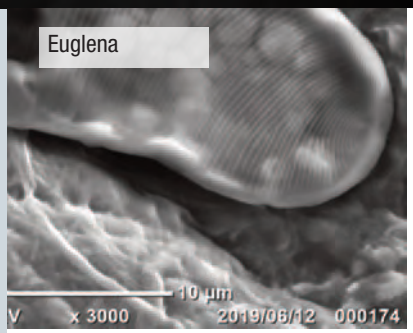


Ordering Information

Cat No.	Description	Qty.
11111-01	**NanoSuit Solution I,** for small or micro-organisms/ living tissues/materials	5ml
11111-02	**NanoSuit Solution II,** for CLEM	5ml
11111-03	**NanoSuit Solution III,** for cells	5ml

Storage Conditions	
Short Term:	Refrigerator, 4°C
Long Term:	Frozen, -10°C

Electron Microscopy Sciences
P.O. Box 550 • 1560 Industry Rd.
Hatfield, Pa 19440
Tel: (215) 412-8400
Fax: (215) 412-8450
email: info@emsdiasum.com
or stacie@ems-secure.com
www.emsdiasum.com



References

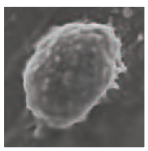
Kawasaki, H., Itoh, T., Takaku, Y. et al. The NanoSuit method: a novel histological approach for examining paraffin sections in a nondestructive manner by correlative light and electron microscopy. Lab Invest 100, 161-173 (2020). https://doi.org/10.1038/s41374-019-0309-7

Shinmura K, Kawasaki H, Baba S, et al. Utility of Scanning Electron Microscopy Elemental Analysis Using the 'NanoSuit' Correlative Light and Electron Microscopy Method in the Diagnosis of Lanthanum Phosphate Deposition in the Esophagogastroduodenal Mucosa. Diagnostics (Basel). 2019;10(1):1. Published 2019 Dec 18. doi:10.3390/diagnostics10010001

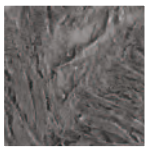
Takaku Yasuharu, Suzuki Hiroshi, Kawasaki Hideya, Ohta Isao, Ishii Daisuke, Hirakawa Satoshi, Tsutsui Takami, Matsumoto Haruko, Takehara Sayuri, Nakane Chinatsu, Sakaida Kana, Suzuki Chiaki, Muranaka Yoshinori, Kikuchi Hirotoshi, Konno Hiroyuki, Shimomura Masatsugu and Hariyama Takahiko 2017A modified 'NanoSuit®' preserves wet samples in high vacuum: direct observations on cells and tissues in field-emission scanning electron microscopyR. Soc. open sci.4160887.

On the Cover

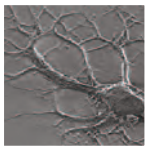
Leukocyte



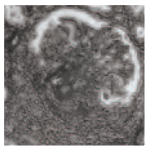
Amyloid deposition of cardiac muscle tissue



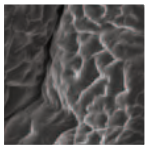
Nerve cell from mouse cerebral cortex



Inflamed kidney tissue (nephritis)



Human stomach tissue



Pansy Viola petal