

MODEL 2550

Cryo Transfer Tomography Holder

Cryo transfer and tomography of thin-film frozen-hydrated/vitrified specimens for low-dose imaging and analysis

FISCHIONE
INSTRUMENTS





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Cryo Transfer Tomography Holder

Cryo transfer and tomography of thin-film frozen-hydrated/vitrified specimens for low-dose imaging and analysis

- **Ideal for specimens that require liquid-nitrogen cooling for transfer to the transmission electron microscope (TEM) for imaging and analysis**
- **Base temperature less than $-175\text{ }^{\circ}\text{C}$**
- **Advanced mechanism for frost-free transfer**
- **Integrated cradle clamp for tool-free specimen mounting**
- **Extended field of view at high tilt up to 80°**
- **Resolution better than 0.20 nm**
- **Low drift rate of $1.5\text{ nm}/\text{min}^{-1}$**
- **Rapid cool-down to operating temperature**

CRYO-ELECTRON TOMOGRAPHY

Cryo-electron tomography is a well known technique used for the evaluation of biological specimens. Structural details are imaged in three dimensions in a transmission electron microscope at cryogenic temperatures to reveal information from specimens such as proteins and viruses.

Cryo Transfer Tomography Holder, cryo workstation, and temperature controller are shown above.

Liquid nitrogen cooling for the transfer of frozen-hydrated/vitrified specimens

The Cryo Transfer Tomography Holder is an advanced single-tilt holder that provides cryogenic specimen cooling with an extended field of view at high-tilt angles up to 80°. Tomographic data can be acquired in TEMs with pole-piece gaps of approximately 5 mm.

Cryo Transfer Tomography Holder companion products include the cryo workstation and the temperature controller, which are sold separately. The holder is shipped in a Model 9010 Vacuum Storage Container.

Simple specimen loading and transfer

The innovative design of the specimen tip makes loading and unloading of the specimen easy. To load a specimen, the holder is inserted into a cryo workstation or the TEM to cool down. The holder dewar and the cryo workstation are both filled with liquid nitrogen. The modular design of cryo workstation's grid box allows you

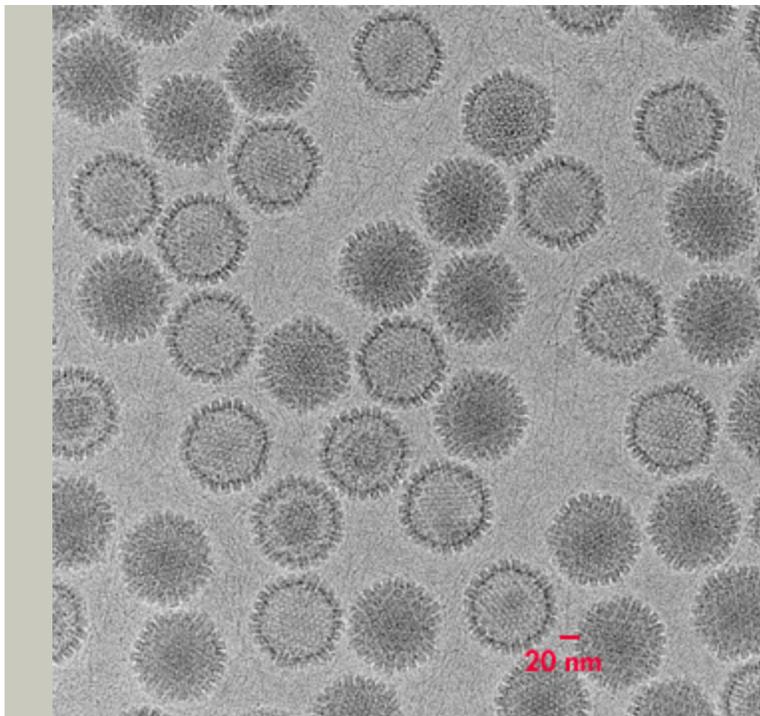
to reposition the reservoirs to enhance ease-of-use for both right- and left-handed operation.

Once a temperature of less than -175 °C is achieved, a specimen is loaded from the grid box into the holder tip. The holder accepts a 3 mm diameter TEM specimen grid, which is secured by the holder's one-piece, integrated cradle clamp. The clamp automatically closes when the holder tip is retracted. Optionally, the cradle clamp can be closed with forceps or with the supplied specimen tool. The thin profile of the clamp maximizes specimen visibility, even at high-tilt angles.

The specimen holder tip retracts inside an actively cooled cryo shield located within the holder. This shield prevents any atmospheric water from condensing on the specimen during transfer to or from the microscope.

Rapid cool down, extended hold time

The Cryo Transfer Tomography Holder rapidly reaches a working temperature of less than -175 °C in either the cryo workstation or a TEM.



HERPES SIMPLEX VIRUS TYPE 1 (HSV-1) KOS C-CAPSID

The capsids are icosahedral, 1250 Å in diameter and the sample includes DNA-filled C-capsids, as well as empty A-capsids and B-capsids that retain some component of the scaffold structure used in their assembly. The background includes strands of double-stranded DNA (dsDNA) that has been lost from some capsids. Taken by FEI TF20 TEM (magnification 50000x at 200 keV, electron dose of ~20-25 e-/Å²) using the Model 2550 Cryo Transfer Tomography Holder at -178 °C. Sample prepared using FEI Vitrobot Mk III on Quantifoil R2/1 grid.

Image courtesy of Alexander Makhov, Jamie Huffman, Fred Homa, and James Conway, University of Pittsburgh School of Medicine.



TOOL-FREE SPECIMEN LOADING

The one-piece, integrated cradle clamp (top) automatically closes (middle) when the specimen tip is retracted (bottom).

Hold times in excess of 4 hours are readily obtained with the 200 ml dewar capacity. A zeolite absorption medium enhances dewar vacuum.

The temperature controller connects directly to the specimen holder dewar and displays the holder tip temperature.

Regenerating the zeolite

The dewar zeolite must be regenerated periodically. This process is made easy with the one-touch Zeolite Regeneration button on the temperature controller. Fischione Instruments recommends the Model 9030 Turbo Pumping Station to evacuate the dewar during regeneration.

Plasma cleaning

Prior to freezing thin films, TEM carbon support grids should be cleaned to remove hydrocarbons and to make the grids' surface hydrophilic. Fischione Instruments recommends that you clean the support grids with the Model 1020 Plasma Cleaner or Model 1070 NanoClean.

Collision protection

Fischione Instruments' advanced tomography holders are compatible with the TEM's touch alarm that stops goniometer movement if a pole touch occurs. Follow the microscope manufacturer's recommendation for operating the goniometer at high-tilt angles.

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CRYO WORKSTATION

The modular reservoirs in the cryo workstation can be repositioned to accommodate left- or right-hand use.

DEWAR ZEOLITE REGENERATION

The Model 9030 Turbo Pumping Station is a simple to use, easily customized, vacuum pumping station for TEM specimen holders. The pumping station evacuates the Model 2550 Cryo Transfer Tomography Holder's dewar during zeolite regeneration. It can also pump down JEOL, Ltd. and Thermo Fisher Scientific TEM specimen holders and keep the holders under vacuum during storage.

The Turbo Pumping Station is customizable; you can stack single Thermo Fisher Scientific or JEOL holder ports and add additional holder ports as needed, or use a quad holder dock that allows you to mix and match four Thermo Fisher Scientific or JEOL and holder ports.



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