

heating & biasing



Product Series 1550 TEM SPECIMEN HOLDER

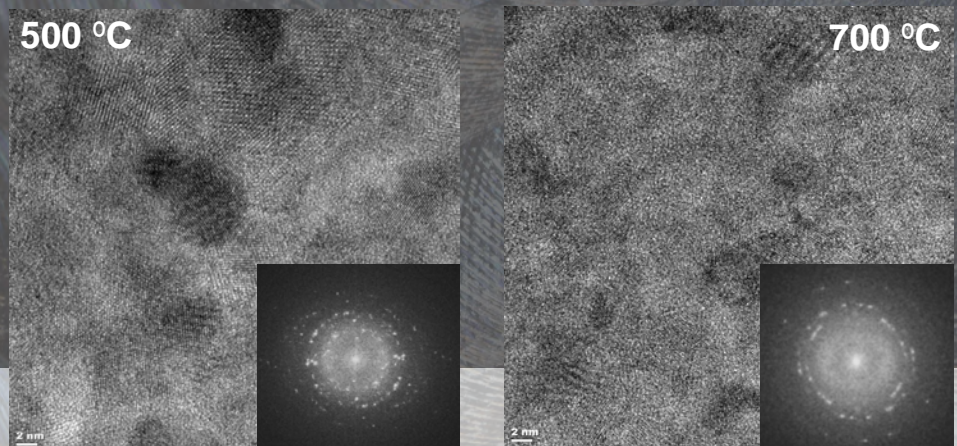
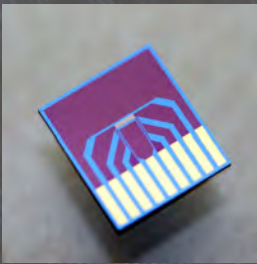
Hummingbird Scientific's in-situ TEM Electrical Biasing and MEMS Heating Holder combines innovative engineering and microfabrication techniques to bring heating and biasing capabilities within one single platform. The TEM holder allows simultaneous electrochemical biasing and sample heating with 9 electrical connections. The holder is available in single and double tilt versions. Hummingbird Scientific's microfabrication division provides combined heating and biasing chips as well as biasing chips that insert directly into the holder without required additional connections.

Our heating chips employ thin-film heating technology to heat materials to temperatures up to 1100 °C and come with an integrated thermal sensor for close loop determination of the temperature. The small thermal mass of the heating element ensure rapid heating, high stability and low drift rates. The electrode contacts on the chip allow the application and measurement of electrochemical signals while imaging at high magnification.

Application Examples

- Observing changes in nanostructured materials at elevated temperatures
- In situ studies of materials behavior under combined heating and electrical stimuli
- Correlating electrical properties of nanoscale material with microstructure
- Operating MEMS devices-like mechanical testing devices

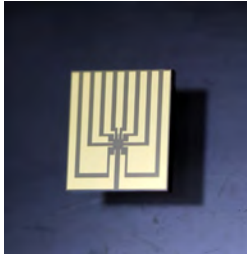
Thin Film Heating



High resolution TEM images of nanocrystalline TiN films heated to 500 °C (center) and 700 °C (right). FFT of the image is given in the inserts. Images courtesy of Dr. Robert Colby and Dr. Bernd Kabius (Pacific Northwest National Laboratory). Hummingbird Scientific 9-Pin Biasing Chip (left)

Product Series 1550 In-situ TEM Biasing and Heating Holder

Standard Product

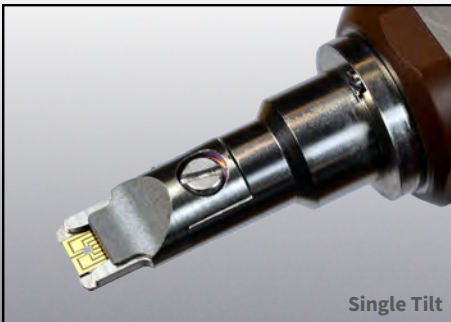


Related Products

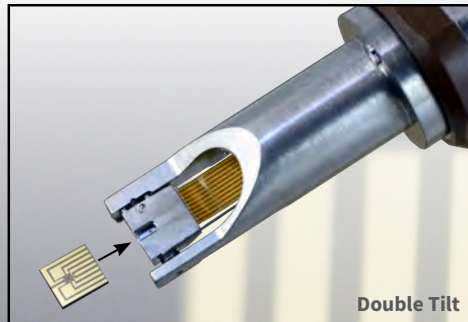
- 9 electrical contact points
 - Direct insertion chip mechanism
 - Available in single or double tilt
 - Alpha tilt: $\pm 30^\circ$ (actual range is dependent on pole piece)
 - Beta tilt: 20° (double tilt holder only)
 - Low noise, fully shielded cabling for pA range current measurements
 - Heating from room temperature to 1100°C
 - Ultra-low temperature drift
 - Ultra-low sample drift
-
- Standard biasing chip consumables
 - Thin film heater chip consumables
 - **Series 1500 TEM Heating Holder:** furnace-type heating holder for conventional and environmental microscopes
 - **Series 1600 TEM Electrochemical Biasing Holder:** electrical biasing holder with flexible contact geometry

Available For

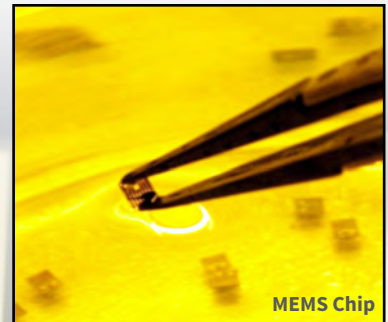
- FEI
- JEOL



Single Tilt



Double Tilt



MEMS Chip



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Image: Hummingbird Scientific Microfab 9 pin biasing chip