Electrical Stages

Analysis of Microelectronics and Semiconductor Materials

Heating and cooling stages
Observe the effect of temperature on the electrical output of your sample

Environmental Control
Chambers can be purged with gas, made suitable for vacuum or humidity

Probes/Spring Clip Connectors
Enabling up to 16 point electrical measurements

Linkam Scientific Instruments

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V1.01 2018

Introducing the Electrical Stages

There are many applications that require the measurement of electrical parameters whilst making microscopic or spectroscopic observations. Linkam Scientific have been creating sample characterisation solutions for the microelectronics and semiconductor field for many years. We design sample characterisation chambers with accurate temperature control ranging from -196°C to 1500°C. The environment within the chamber can also be controlled, with the option of gas purging, controlled vacuum or humidity. To allow for electrical measurements, stages can be fitted with gold tipped tungsten needle probes or spring clip posts which can be coupled to various output connectors. Linkam systems are compatible with light microscopy and spectroscopy including Raman and X-Ray.

HFS series

The HFS series of heating/freezing stages provide an ideal platform for electrical measurement with a temperature range of –196°C to 600°C. Options available for probes, vacuum, humidity and electrical connectors.

LTS series

For applications requiring a larger sample area the LTS stages are ideal. Temperature ranges from –196°C to 420°C with options available for humidity, probes and electrical connectors.

TS series

The TS series is ideal for those studying high power electronics which require extreme temperatures. The temperature ranges from ambient to 1500°C with options available for vacuum and electrical connectors.

THMS series

The THMS electrical stages are used in many applications where high heating/cooling rates, high level accuracy and stability and XY manipulation are needed. It has a temperature range of -196°C to 600°C with options including vacuum, humidity and electrical connections.

Features

WIDE RANGE TEMPERATURES
Stages available covering different temperature and heating rates from –196°C to 1500°C.

STABLE & ACCURATE TEMPERATURE CONTROL
The T96 controller and platinum resistor temperature sensor ensure accurate and repeatable control to better than 0.1°C.

PROBES & ELECTRICAL CONNECTIONS
Stages can be supplied with a wide range of electrical connections and probes depending on your experimental requirements.

ENVIRONMENTAL CONTROL
Variants of the HFS, THMS and LTS series are available that are compatible with the RH95 humidity generator. Variants of the TS, HFS and THMS stages are also available with vacuum compatibility.

Application Examples & Testimonials

Dr Luca Camilli

DTU- Department of Micro and Nano Technology

Custom built probe stage

In our experiment, a custom Linkam LTS600 stage was used in conjunction with Raman microscope. The sample is heated to the desired temperature in the Linkam LTS600 stage, and Raman signal from it is collected through a window. This allowed us to study the oxidation process of the sample under study through Raman spectroscopy.

Galbiati, M. et al. Real-time oxide evolution of copper protected by graphene and boron nitride barriers. Sci. Rep. 7, 39770; doi: 10.1038/srep39770 (2017).

Associate Professor Sharath Sriram

RMIT University - Functional Materials and Microsystems Research Group

Several probe systems including the LTS420E-PB4 with RH95

Linkam stages with electrical probes are integral to our research activities. Our reliance on these stages is highlighted by us having bought six of these over the last few years. The integrated electrical probes combined with heating, cooling, and optical ports has allowed us to explore a number of sensor technologies spanning optics, gas, and conductometric devices. These stages enable critical fundamental materials insight too, for the in situ study of phase transformations."

Sriram et al., Influence of Electric Field on SERS: Frequency Effects, Intensity Changes, and Susceptible Bonds. J. Am. Chem. Soc., 134 (10), pp 4646–4653 DOI: 10.1021/ja208893q (2012).

Professor Chunxioa Cong

Fudan University - School of Information Science and Technology

HFS600E-PB4

The Linkam stage was crucial for temperature-dependent Raman measurement. The HFS600E-PB4 stage was compatible with the confocal low-frequency micro-Raman system, which helped to realize the in-situ temperature-dependent Raman study for revealing the vibrational symmetry, anharmonicity and electron-phonon coupling of the shear modes in ultra-low frequency range of graphene layers."

Cong, C. & Ting, Y. Enhanced ultra-low-frequency interlayer shear modes in folded graphene layers. Nat Commun. 5:4709 | DOI: 10.1038/ncomms5709 (2014).

Dr Wing Chung Tsoi

Swansea University - SPECIFIC

THMS600 + RH95 humidity system

"THMS600 stage was used to control the gas environment and temperature of perovskite solar cells, and with a RH95 humidity system, the humidity around the solar cells can be controlled accurately. These controlled environments allow the study of the stability of the solar cells in details, in particular the crucial humidity-related degradation."

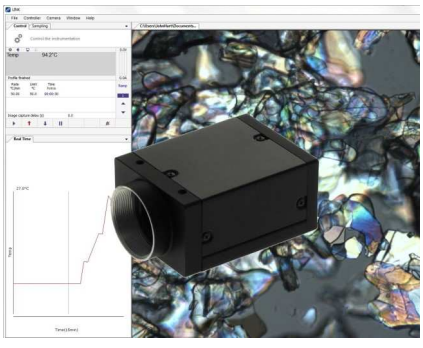
Hooper, K.E.A. et al. Probing the degradation and homogeneity of embedded perovskite semiconducting layers in photovoltaic devices by Raman spectroscopy. Phys. Chem. Chem. Phys. 19, 5246; DOI: 10.1039/c6cp05123e (2017).

Technical Specification*

	HFS600E-PB4*	LTS420E-PB4*	TS1500E*	THMS600E*
Temperature Range	-196°C to 600°C	-196°C to 420°C	Ambient to 1500°C	-196°C to 600°C
Heating Rates Per Minute	0.01°C to 150°C	0.01°C to 50°C	1°C to 200°C	0.01°C to 150°C
Temperature Stability	<0.1°C	1°C	1°C	<0.1°C
Sample Area	22mm	53.5mm x 43mm	7mm x 3mm/6mm	22mm diameter
Objective Lens Working Distance	4.7mm	8.5mm	6.1mm	4.8mm
Lemo/BNC Feed-Through	Lemo & BNC connections available	Lemo & BNC connections available	Lemo connections available	Lemo connections available

*For the full range of stages in this series, please visit our website.

Discover More...



LINK Imaging Systems

Get more out of your Linkam stage, recording the temperature is only half the story. Seeing how your sample changes with changing environment such as temperature, humidity, vacuum, tensile or shear force can provide important information about your sample. Changes to the physical characteristics of your material such as surface structure, colour, opacity, size and shape can be analysed from the images. Add one of the LINK Imaging Systems to record images of your sample automatically during your experiment. There are a range of LINK Imaging Systems available optimised for use with Linkam stages.

Humidity

The RH95 Relative Humidity Controller provides environmental sample control to Linkam's range of temperature stages. It provides precise control in a compact, self-contained package with no requirement for dry air supply. The RH% is accurately controlled between 10%-90% (temperature range ambient to 85°C).

Imaging Station

The Imaging Station is compatible with all Linkam heating and cooling stages. It has been specially designed with a pivoted mechanism to allow greater access to your samples. There are reflected and transmitted light options available and it is compatible with a range of long working distance objective lenses.

Contact Details

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We make scientific instruments that help characterise materials from polymers to biological tissue and metals to composites. Our instruments are used for research by the world's most advanced scientific organisations and companies. Each of our instruments are designed and manufactured in-house by our team of highly experienced electronics, software and mechanical design engineers. We design and develop solutions for sample characterisation by collaborating with the best scientists in the world. Will you be next?

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