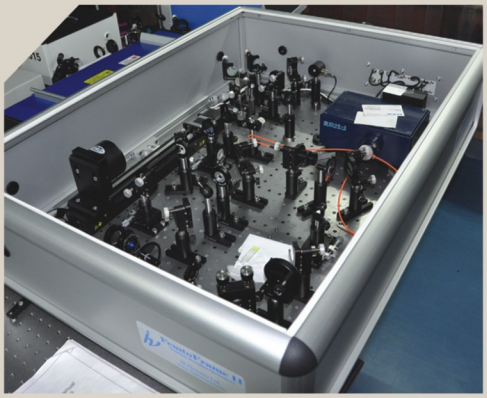
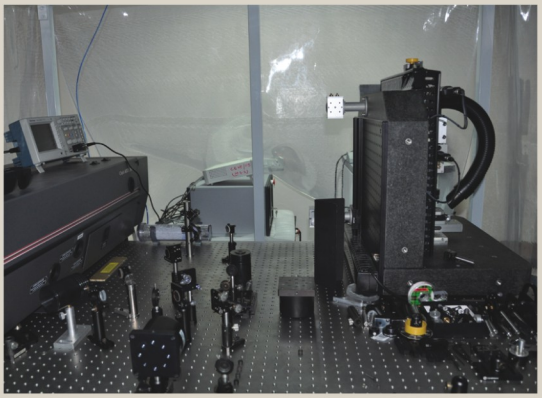
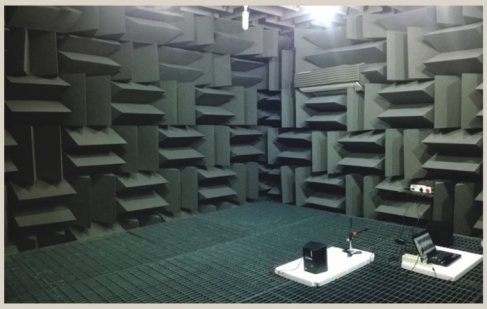
Volume 2, Issue 5 August 2014

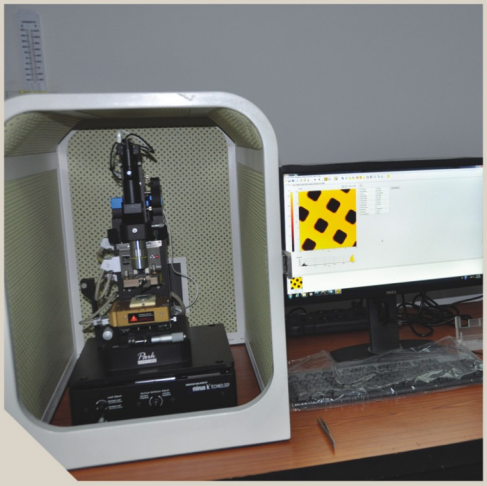
R&D Newsletter

INDIAN INSTITUTE OF TECHNOLOGY KANPUR

special issue on
Advanced Research Equipment procured under CARE Scheme of IIT Kanpur




soft copy of the newsletter is available at
www.iitk.ac.in/dord/newsletter.htm

Procured in the Financial Year: 2013-2014

Atomic Force Microscopy (AFM) integrated with Friction Force Microscopy (FFM) and Nano Indentation

Model: Xe7 from Park System South Korea

Capabilities

- XE7 Atomic Force Microscope is capable of scanning sample for lowest noise and gives best resolution image.
- This system works with new generated software techniques, such as XEP (Data Analysis and Optical View), XEI (Image Processing) and XEL (Lithography Analysis).
- The system includes the Contact Mode, Non Contact Mode, Lateral/Friction Force Microscopy Mode, Magnetic Force Microscopy Mode, Lithography Mode, and Nano Indentation Mode (Nano Indentor up to 20 mN).
- The resolution of the system is 1.5 nm (Close Loop) and < 0.01 nm (Open Loop). Sample size is 100 × 100 × 20 mm.

Location

Tribology & Surface Engineering Laboratory, NL - 1
Dept. of Mechanical Engg

Contact

Prof. Arvind Kumar
arvindkr@iitk.ac.in

Mr. Jitendra K Katiyar
jkatiyar@iitk.ac.in

User Charge

Rs. 1000 per slot for normal tip
Rs. 2000 per sample for nano indentation/MFM/Lithography/FFM
(Service Tax is applicable for outside IITK users)

MicroCal iTC$_{200}$ System

Capabilities

Isothermal titration calorimeter for direct and label-free quantitative measurement of binding affinity and thermodynamic parameters of binding interactions in solution with biomolecules.

Location

Core Laboratory
Room No. CL-201E

Contact

Prof. Ashis K. Patra
akpatra@iitk.ac.in

Energy Dispersive Spectroscopy

Model: Oxford INCA x-act

This instrument is procured to upgrade the system Scanning Electron Microscope (Carl Zeiss EVO MA 18) [procured under the CARE scheme,Financial Year 2010-2011]

Location

Second Floor, Central Facility
Biological Sciences and
Bioengineering Department (BSBE)

Contact

Prof. Dhirendra S. Katti [Convener]
dsk@iitk.ac.in

Suman A Gupta [Operator]
sumang@iitk.ac.in

User Charge

SEM Imaging [90 min. slot]

BSBE Users = Rs. 500
IITK Users = Rs. 1000
Non-IITK Users = Rs. 3500

Gold Coating

BSBE Users = Rs. 250
IITK Users = Rs. 250
Non-IITK Users = Rs. 1000

(Service Tax is applicable for outside IITK users)

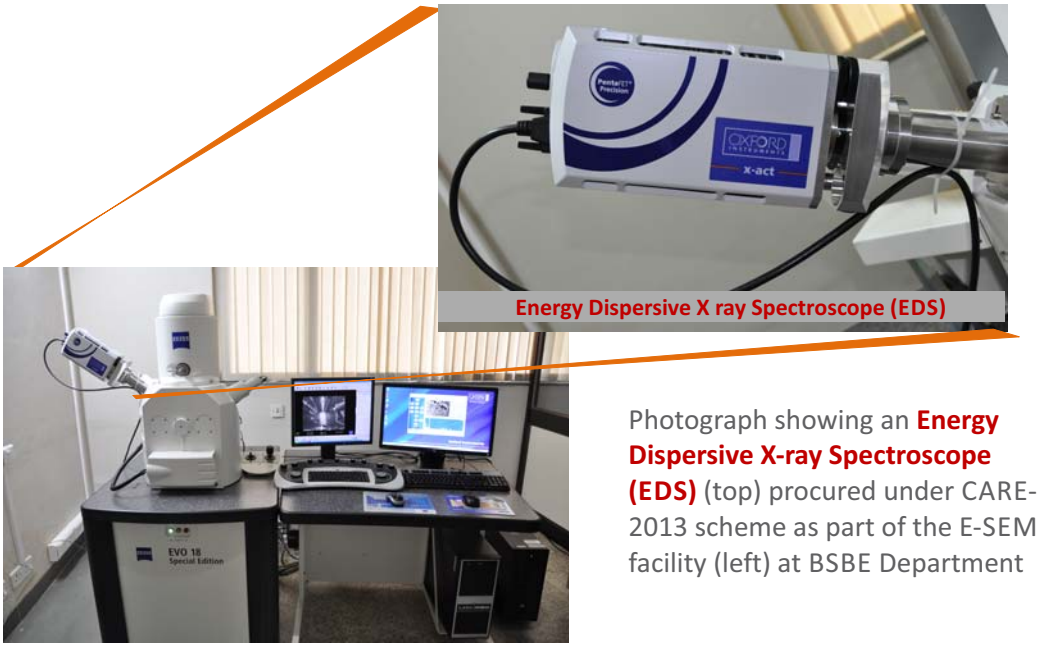
Energy Dispersive Spectroscopy (EDS) is a non-destructive method for identification of elements present in the sample. Elemental Analysis can be performed over a very small spot on the sample, or a whole frame. This is a useful tool in the field of Engineering, Chemistry, Geology and Biology for identification of corresponding metal, metal alloys, minerals and ceramics.

EDS Capabilities/Specification

Detector is 10mm² Silicon Drift Detector [SDD] incorporated with INCA EDS Analysis Software with features of Spectral imaging, Elemental mapping, MnKα resolution down to 127eV, Liquid Nitrogen free operation, Quant Optimization by Standard Cobalt sample 99.995% [metal basis].

Services

- Scanning Electron Microscopy (SEM) – Secondary Electron imaging useful for surface morphology studies.
- Variable Pressure Scanning Electron Microscopy (VP-SEM) –
  - Possible analysis and imaging of non-coated, non-conductive materials with minimal local surface charging
  - Possible analysis of vacuum sensitive materials, such as moist, hydrated, or out-gassing samples
- Backscattered Electron Imaging – BSE Imaging provides image contrast and is suitable for obtaining surface topography and different elemental composition.
- Energy-dispersive X-ray Spectroscopy – EDS Analysis ideal for qualitative analysis and spectral mapping during SEM analysis.
- Metal Coating of Sputtered Gold/Palladium for SEM Imaging



Energy Dispersive X ray Spectroscope (EDS)

Photograph showing an **Energy Dispersive X-ray Spectroscope (EDS)** (top) procured under CARE-2013 scheme as part of the E-SEM facility (left) at BSBE Department

Procured in the Financial Year: 2013-2014

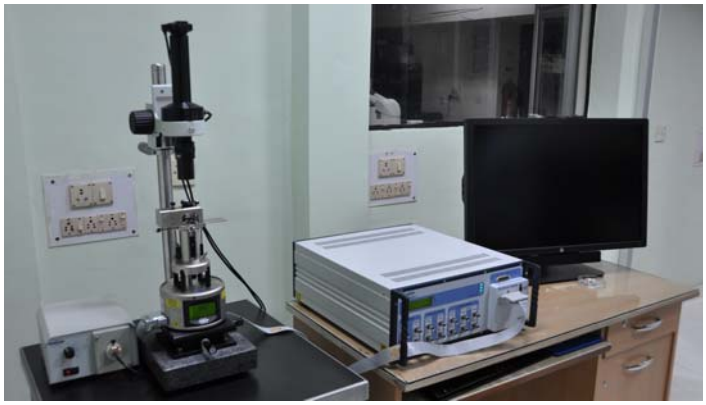
Procured in the Financial Year: 2013-2014

Surface Potential Microscope

Model: Bruker Multimode 8 AFM (Atomic Force Microscopy)

This is a high resolution and one of the best multimode AFMs by Bruker. It is an industry-leading AFM microscopes, provides the highest levels of performance, flexibility and productivity and incorporate the very latest advances in atomic force microscopy techniques (including the proprietary Peak Force Tapping, technologies of PeakForce QNM, PeakForce KPFM, ScanAsyst and various other modes) to enable the widest array of application areas.

The model is Multi Mode, 8 whose details can be found on http://www.bruker.com/products/surface-analysis/atomic-force-microscopy/multimode-8/overview.html



Location

Lab No. 104
Northern Lab II

Contact

Prof. Animangsu Ghatak
aghatak@iitk.ac.in

Mr. Santosh Rathore
rathoresantosh360@gmail.com

User Charge

(per one hour slot)

Rs. 2000 (for CHE Department)
Rs. 3000 (for all other Department across IITK)

Non-Contact Optical Profilometer

Model: Bruker GT-KO

Profilometry renders information about the surface features and topography of the surface. In conventional contact mode profiling, a mechanical stylus comes in contact with the surface to trace the surface features, which is time consuming method and tends to alter/damage the surface features. On contrary, non-contact optical profilometer is able to trace the surface topography and quantify the roughness without damaging the actual surface features. It utilizes optical light interference principles to scan and quantify topographic features of various materials ranging from hard ceramics/metals to soft polymers or biological cells.

Important features of non-contact profilometer are:

- Green Light Source as standard (high resolution imaging) + White Light Interferometry.
- Spatial Sampling of 40 nm. Up to 0.3 - 0.5 µm lateral resolution
- Objectives of 50X + 2X Zoom lens + High Resolution Camera (1280 X 960 pixels).
- Maintains the same pixels to provide high resolution images even at high magnification.
- Can work in both phase-shift mode and vertical-shift mode.
- Advanced software included to stitch images into large collage.
- Can work in very wide environment conditions.

Location

Advanced Center for
Materials Science (ACMS)

Contact

Prof. Kantesh Balani
kbalani@iitk.ac.in

Mr. Kamlesh Thapliyal
kamlesht@iitk.ac.in

Facility for Transgenesis of Multiple Model Organisms

Transgenic techniques have revolutionized biological science research. This technique allows scientists to introduce or eliminate a gene of choice from an organism to interrogate the role of the gene in the physiology of the animal. BSBE department had infrastructure to conduct such experiments in worms, flies and birds but not in fish or mice. The equipments obtained through the CARE proposal (2012-13) lays the foundation to eventually achieve these.

Location

Mouse Facility

First Floor,
BSBE (Biological Sciences & Bioengineering) Building

Zebra Fish Facility

Basement,
BSBE (Biological Sciences & Bioengineering) Building

Contact

Mouse Facility

Prof. Amitabha Bandyopadhyay
abandopa@iitk.ac.in

Zebra Fish Facility

Prof. Pradip Sinha
pradips@iitk.ac.in

The acquired facility integrates two platforms which together makes transgenesis (genetic manipulation) in fish and mice feasible: namely,

1. a setup for in vivo manipulation (a set of high-end stereo binocular microscopes with fluorescence and imaging accessories) and
2. post-transgenesis care and rearing of genetically modified organisms.

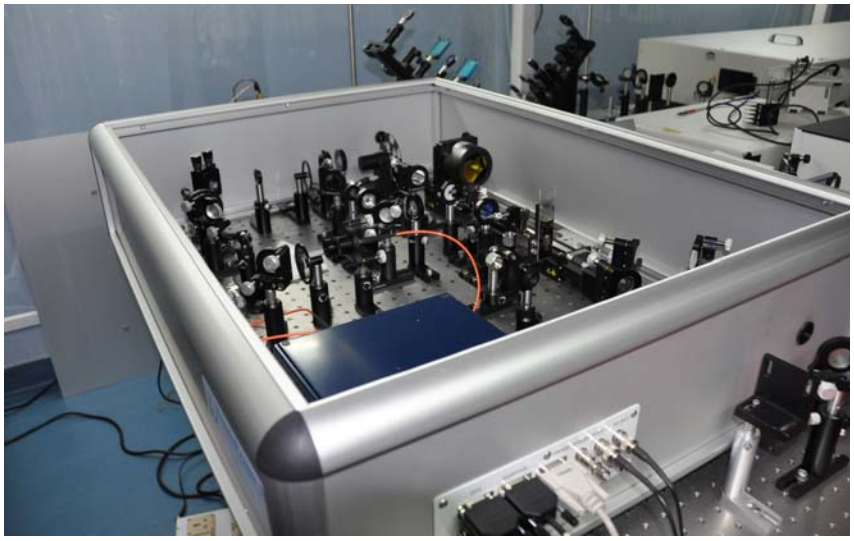
The items under component (1) is a set of three stereo-binocular microscope while those under component (2) includes set up for (a) aquaculture with sanitized, temperature- and oxygen-regulated circulated water system and culture tanks for Zebrafish and (b) individually-ventilated caging system for post-operative sterile housing of the transgenic animals.

Photograph showing the **individually ventilated cage system** and the **ventilator** installed in the BSBE laboratory to house transgenic mice

Procured in the Financial Year: 2012-2013

Femtosecond Transient Absorption Spectrometer

The machine is capable to detect transient species in a chemical reaction.



Location

Core Laboratory
Room No. 101A

Contact

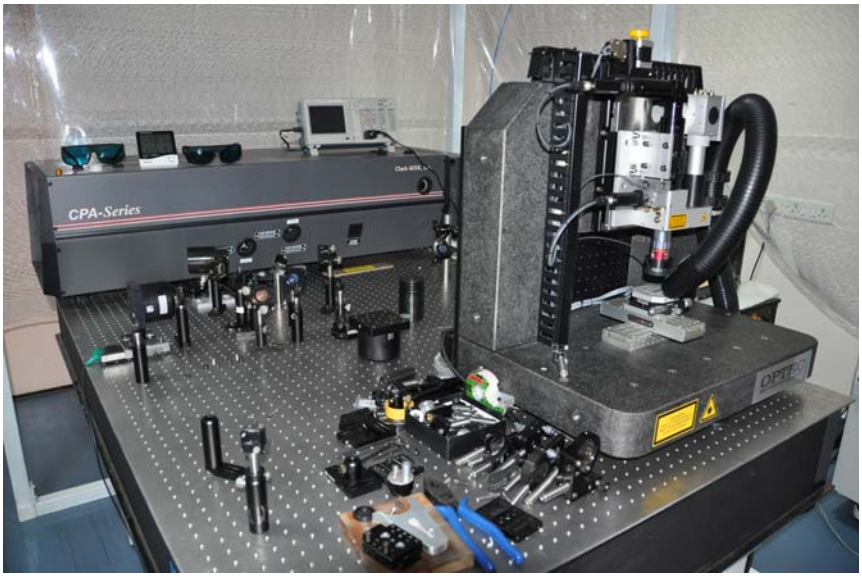
Prof. Pratik Sen
psen@iitk.ac.in

User Charge

Free

Femtosecond Laser based Beam Delivery and Scanning System

This is a Beam delivery unit for femtosecond laser based micromachining. It is capable of machining objects of micron dimensions in different materials, specifically meant for optical waveguiding and related optical studies. The precision of the machining work is dependent on the material, energy of the laser used and the focusing capabilities of the system.



Location

Southern Laboratory
Room No. 211 (First Floor)

Contact

Prof. R. Vijaya
rvijaya@iitk.ac.in

TA for the machine can be contacted at amarghar@iitk.ac.in

More Info Available @

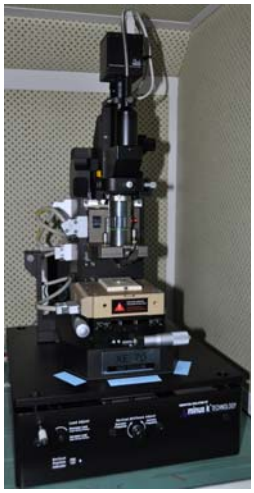
http://www.iitk.ac.in/celt/CELT/Femtosecond%20Lab/index.html

Atomic Force Microscope

Make: Park Systems
Model:XE70

Salient Feature

Large area scanner for scanning over 100 μm X 100 μm area (maximum) on any surface



Capabilities

Contact and non-contact modes, Area scan of 100 μm X 100 μm, z-range of 10 μm, Minimum feature resolution of 1nm, Liquid cell for scanning in liquids, surface spectroscopy, with 20X optical microscope, vibration free table (-K technologies) and acoustic enclosure. For more details see, http://www.parkafm.com/product/product_view.php?gubun=R&id=13

Location

Core Laboratory
Room No - 104B

Contact

Prof. S. A. Ramakrishna
sar@iitk.ac.in

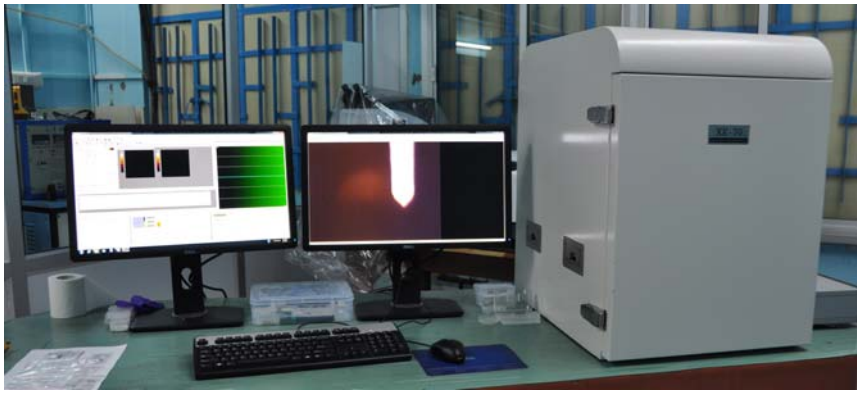
Mr. Dheeraj Pratap
pdheeraj@iitk.ac.in

User Charge

Rs. 1000 for a Slot (2hours) with normal tips

More Info Available @

http://home.iitk.ac.in/~sar



Procured in the Financial Year: 2012-2013

Large Scale Centrifugation Facility

Model: Sorvall Lynx 6000 Superspeed Centrifuge (Floor Model)

Capabilities

- Large volume of samples i.e 1000 ml x 6 = 6 Liters can be centrifuged at a time
- Speed Range: 500 -29,000 rpm
- Max RCF: 1,00,605 g
- Temp. range: -20°C to 40°C

Location

Central Facility Room (Ground Floor)
Biological Sciences and Bioengineering Department (BSBE)

Contact

Head of Biological Sciences and Bioengineering Department
head_bsbe@iitk.ac.in

Anechoic Acoustic Chamber

The term anechoic implies non - echoing or echo-free. An anechoic chamber is a room designed to absorb all sound reflections. Such chambers are used to characterize noise sources, sound absorbing materials, sound sensors and also conduct a variety of acoustical experiments requiring free field conditions.

Capabilities

The anechoic chamber at IITK has a cut-off frequency of 200 Hz, and its noise rejection ratio (with respect to its outside) exceeds 65 dB. The chamber has a usable volume of 5 m X 5 m X 3 m. IITK is one of the very few academic institutions in the country to have such a chamber. This chamber has been designed at IITK, and a supplier from within the country was used to fabricate it, resulting in significant cost savings.

Location

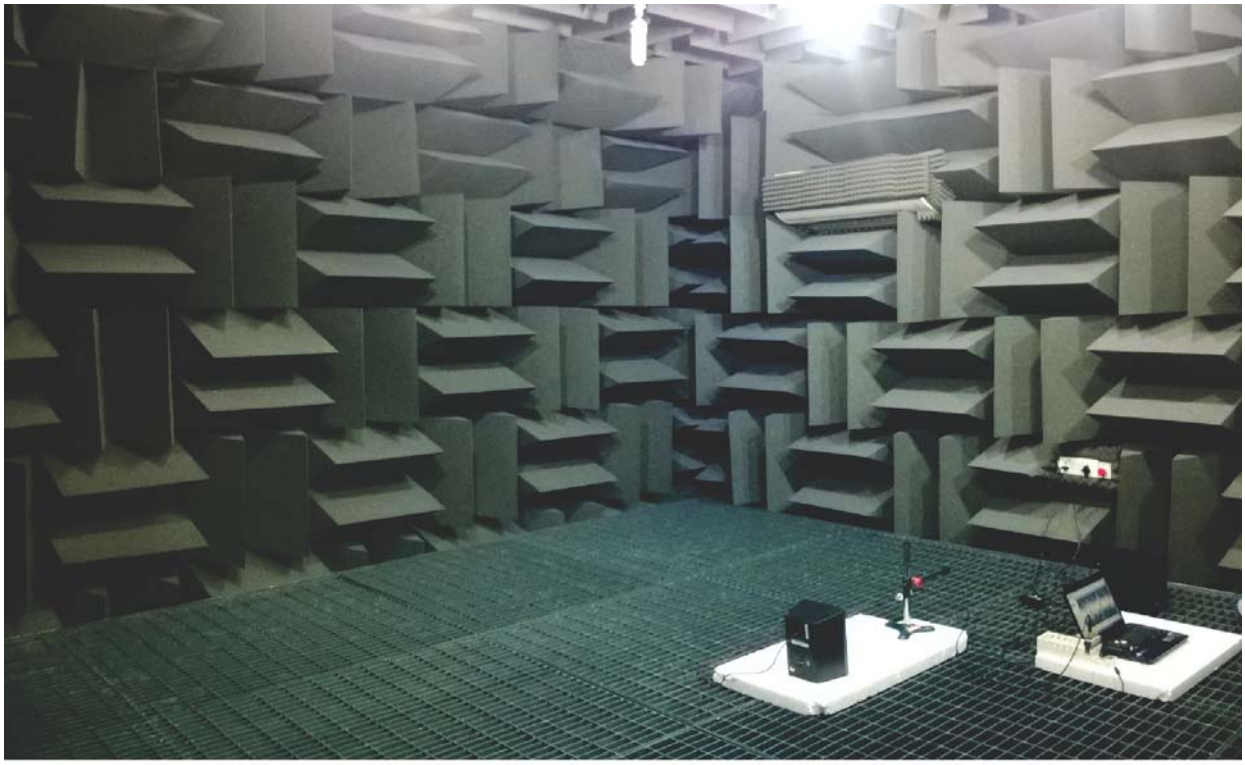
3rd floor,
Helicopter Building

Contact

Prof. Nachiketa Tiwari
ntiwari@iitk.ac.in

More Info Available @

http://home.iitk.ac.in/~ntiwari



Procured in the Financial Year: 2012-2013

Feedback/Suggestions

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