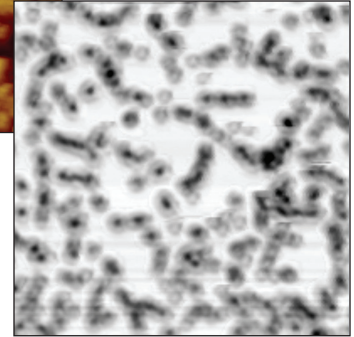
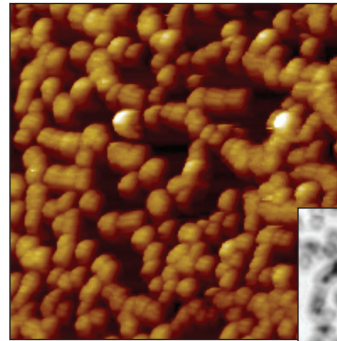
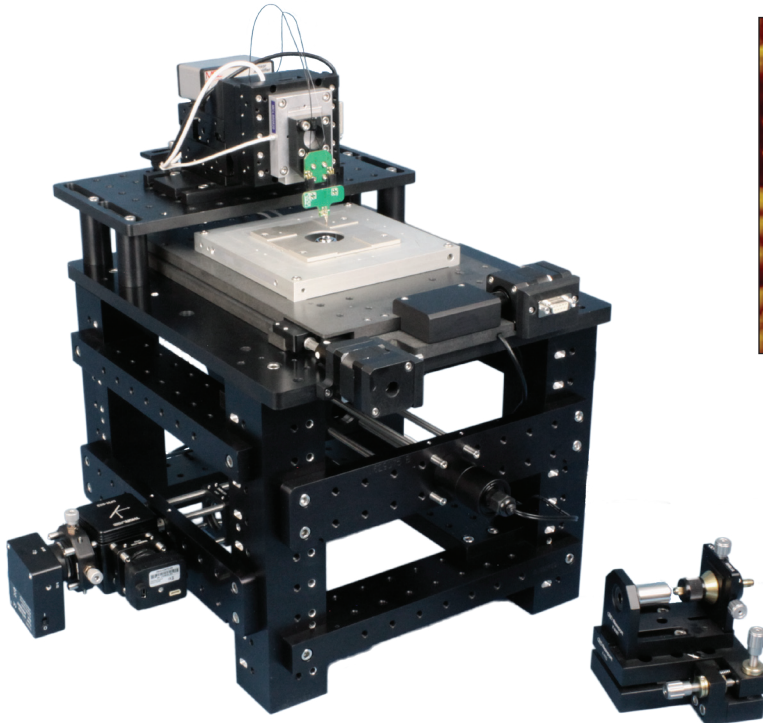


## Features

- ▶ Complete inverted optical microscope
- ▶ Six axes of motorized control
- ▶ Closed loop nanopositioning in XYZ
- ▶ Independent automation for fiber alignment to optical axis
- ▶ Alignment camera and detection APD included
- ▶ Software included

## Other Applications

- ▶ Aperture-less NSOM
- ▶ Resonant probe AFM
- ▶ Near field spectroscopy
- ▶ Fluorescence & epifluorescence microscopy



▲ 50  $\mu\text{m}$  x 50  $\mu\text{m}$  images of 500nm diameter polystyrene beads on a glass coverslip.

Images taken using Mad City Labs AFM (left) and NSOM (below). NSOM: Transmission mode using 640nm light with 100x, 1.25 N.A. objective lens and avalanche photodiode.

## Product Description

The MCL-NSOM is a fully operational near field scanning optical microscope. It has been built on Mad City Labs versatile RM21™ microscope which allows users to convert between NSOM, SPM, and fluorescence optical microscopy techniques.

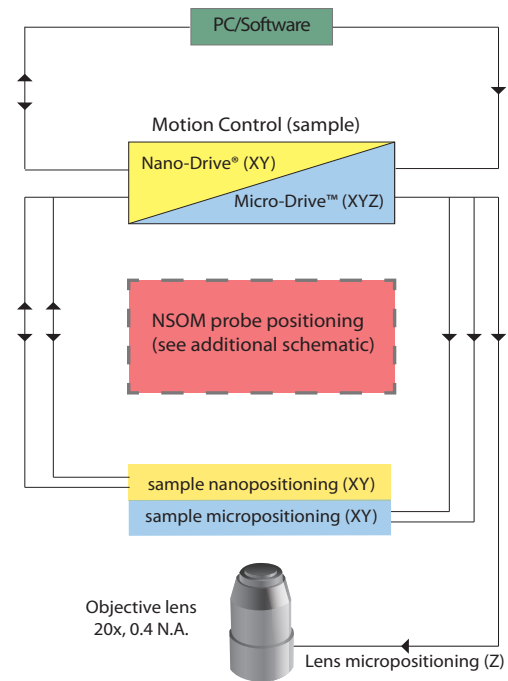
The MCL-NSOM builds on our successful resonant probe SPM and incorporates common elements such as the MadPLL® phase lock loop controller. The NSOM also exploits our expertise in precision motion control by including six axes of motorized positioning, for the sample and NSOM probe, and three axes of closed loop nanopositioning to provide exceptional position resolution and accuracy.

The MCL-NSOM also includes a 635nm laser excitation source, fiber launch, objective lens (20x, 0.4 N.A.), CMOS alignment camera and avalanche photodiode detector. The microscope configurable design allows researchers to tailor the instrument for many different optical microscopy techniques including near field spectroscopy.

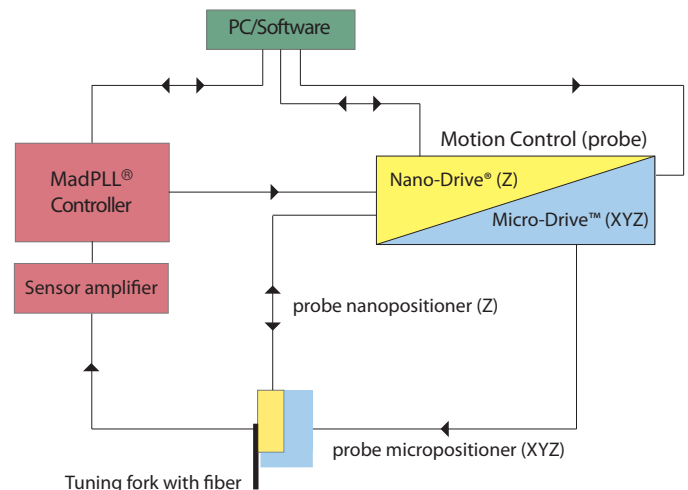
The MCL-NSOM is operated in aperture mode with shear force feedback. The standard 5 modes are supported: illumination, collection, illumination and collection, reflection and reflection collection. We supply a LabVIEW based software package which automates the motion control features.

## Technical Specifications

| Motion Control                        |  |
|---------------------------------------|--|
| Sample micropositioning (XY)          | 25 mm  |
| Lens micropositioning (Z)             | 50 mm  |
| Fiber micropositioning (XYZ)          | 25 mm  |
| Micropositioning step size            | 95 nm  |
| Micropositioning controller           | Micro-Drive  |
| Nanopositioning range of motion (XYZ) | 200 $\mu\text{m}$ $\times$ 200 $\mu\text{m}$ $\times$ 30 $\mu\text{m}$ |
| Resolution                            | 0.4 nm (XY), 0.06 nm (Z)   |
| Step size                             | 0.2 nm (XY), 0.03 nm (Z)   |
| Nanopositioning controller            | Nano-Drive®  |
| Communication                         | USB 2.0  |
| DAC/ADC                               | 20 bit   |
| TTL outputs                           | 4 channels   |
| NSOM                                  |  |
| NSOM operation                        | Aperture   |
| Feedback                              | Shear Force  |
| Phase lock loop controller            | MadPLL®  |
| Software                              | AFMView™   |
| Software compatibility                | LabVIEW™   |
| Objective lens                        | 20x, 0.4 N.A.<br>(Infinity corrected)                                  |
| Excitation and detection              | 635nm, 5mW laser diode with fiber launch                               |
|                                       | 0.3MP fiber alignment CMOS camera                                      |
|                                       | Avalanche photodiode (200nm-1000nm, 1mm active area)                   |
| Supplied accessories                  | Coaxial illuminator (LED)  |
|                                       | Tuning fork with attached single mode fiber for NSOM                   |
|                                       | Tuning forks with etched tungsten tips (3)                             |
|                                       | Tuning forks (10)  |
| Power supply                          | 90 - 260 VAC (50/60Hz)   |
| Operating system                      | Windows Vista/7/8/10   |



Instrument overview of MCL-NSOM hardware



Schematic of the probe positioning element