

# Imaging in Liquid on Jupiter XR AFM

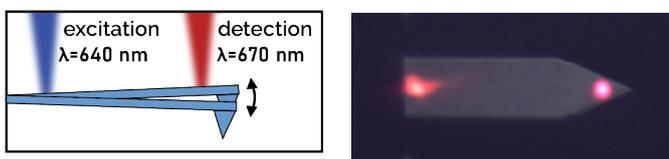
Imaging in liquid on the Jupiter™ XR AFM is enabled by the use of a liquid compatible cantilever holder and blueDrive™ technology. Imaging is simple to set up, stable over time, and results in high quality images of a wide range of samples such as molecules, biomaterials, and various coatings.

## Liquid environment experiments

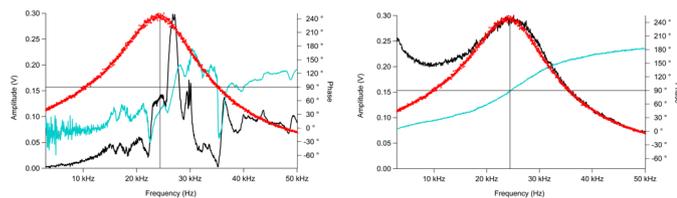
From DNA molecules, to proteins, to devices that need to stay hydrated, the liquid compatible cantilever holder and blueDrive technology enable liquid imaging on Jupiter XR AFM. High resolution data can be acquired in water, buffer or other liquids.

## blueDrive Photothermal Excitation

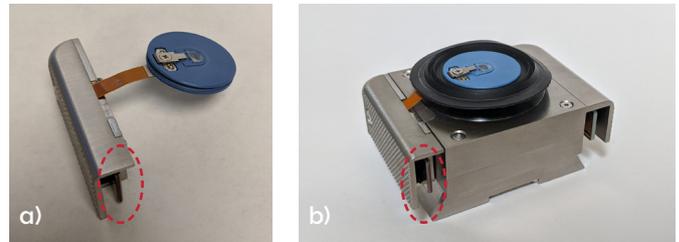
Asylum Research's exclusive blueDrive technology improves tapping mode-based imaging techniques by replacing piezoacoustic excitation of the cantilever with photothermal excitation. With blueDrive, cantilever tuning is clean and avoids the so-called "forest of peaks" as shown in the figure below. Having only one peak simplifies the tuning procedure and speeds up the experimental setup. Additionally, unlike piezoacoustic drive, blueDrive is both stable over time, enabling extended periods of data collection without any adjustments by the user, and lower noise.



a) blueDrive concept, sketch (left), actual top-view optical image (right) showing the laser focus positions.



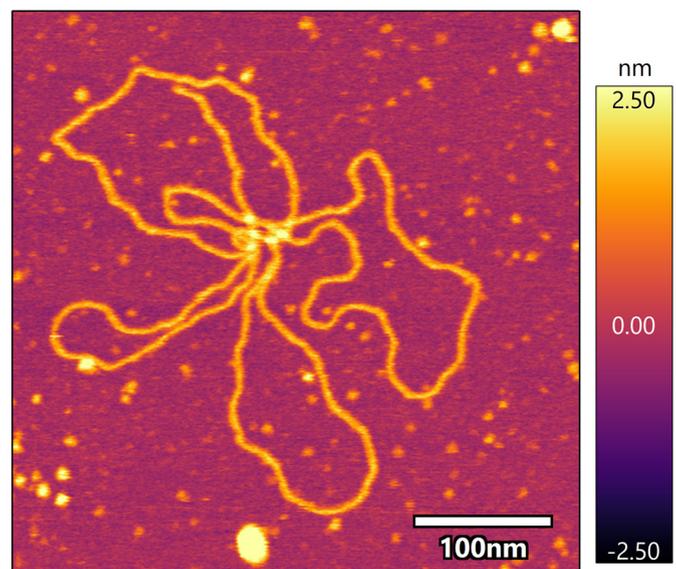
b) Comparison of tunes performed in liquid using piezo drive (left) which exhibits the "forest of peaks" and blueDrive (right) with a single resonance peak. Red trace is the thermal response of the cantilever, black trace is the cantilever tune, and blue trace is the phase response.



a) Liquid compatible cantilever holder with a dedicated ID module  
b) liquid cantilever holder equipped with a protective membrane mounted on the Z scanner

## Imaging in Liquid on Jupiter XR

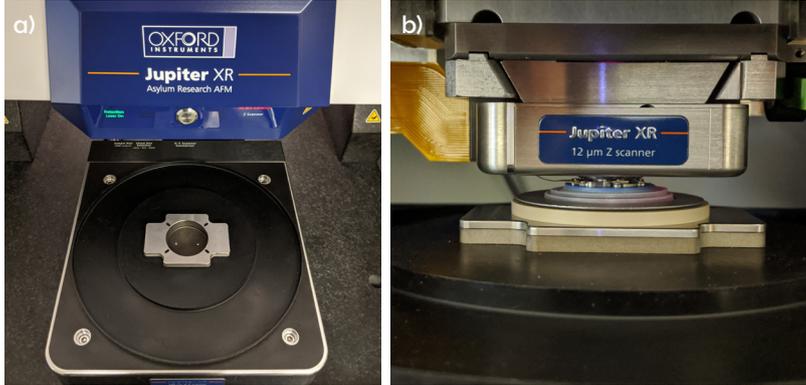
The Jupiter XR liquid cantilever holder is made from chemically inert PEEK and is equipped with a Viton® membrane to create a semi-sealed environment when used with the CellLite sample holder. The membrane prevents evaporation during experiments and protects the Z scanner from contact with liquid. The liquid cantilever holder has a dedicated ID module which plugs in the AFM and allows for automatic software identification, quick setup, and use.



DNA on mica in buffer. Imaged with AC40 + blueDrive.  
(4.88 Hz, 512 × 512, 400 nm)

## Accessory chuck for safe accessory operation

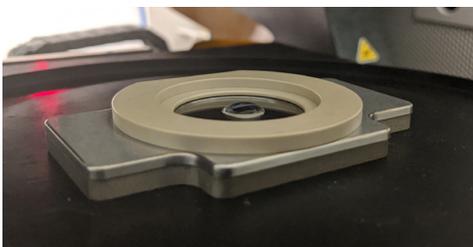
The accessory chuck has an embedded ID chip, which is automatically recognized by the software to simplify the experimental setup. The accessory chuck provides a stable XY scanner attachment base for the accessories and its flexible membrane protects the AFM from accidental liquid spills.



a) Accessory chuck placed on the XY scanner b) Close up view of the CellLite fluid dish mounted on the accessory chuck.

## CellLite Fluid Dish Sample Holder

The CellLite is a fluid dish designed to accommodate samples up to 35 mm in diameter. A Viton membrane attaches to the liquid cantilever holder, aligns and rests on the CellLite to serve as an evaporation shield during experiments. CellLite can accommodate a larger volume of liquid, compared to the droplet technique, which simplifies the setup and allows for experimental versatility. Since there are no ports to be plugged, accidental leakage is minimized. The dish is made of PEEK for chemical resistance and the O-rings are FKM (Viton equivalent).



CellLite fluid dish mounted on the accessory chuck

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## Specifications

The Jupiter XR liquid imaging kit includes a liquid compatible cantilever holder, a protective Viton membrane, and a CellLite sample holder. Liquid imaging on Jupiter XR also requires an accessory chuck that can be shared with other environmental control accessories.

### Sample compatibility

- Samples up to 30 mm diameter and 5 mm thickness
- Supports up to 10 mm sample translation

### Cleaning

- Cantilever holder
  - Removable clamp for cleaning
  - Wipe with alcohol
  - Do not fully immerse in fluid
- CellLite
  - Easy and complete disassembly
  - Autoclavable

### System compatibility

Jupiter XR



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