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PROJECT ISA - ANR-PNANO PONAME

ACI NANO2M3 and ANR-PNANO PONAME

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ACI NANO2M3

In 2003, the team had an integrated ACI named Nano2m3. This project was in collaboration with the LNIO (Laboratory of Nanotechnology and Optical Instrumentation) from the University of Technology of Troyes.

The objective was to achieve a sample-holder stage dedicated to near-field microscopy, capable of moving over an area of 5 mm by 5 mm in the XY plane, with resolution and repeatability at the nanometer order.

Indeed one of the problems in atomic force microscopy is that the scanning area is typically limited to 100 microns due to the piezoelectric actuators. Moreover, the resolution is also limited to 1024 pixels, or about 100 nm at full stroke.

This issue is also true in electron beam lithography where the ability to produce patterns of several millimeters with nanometer resolutions remains a challenge. Figure 1 illustrates the target of the project and some application fields.

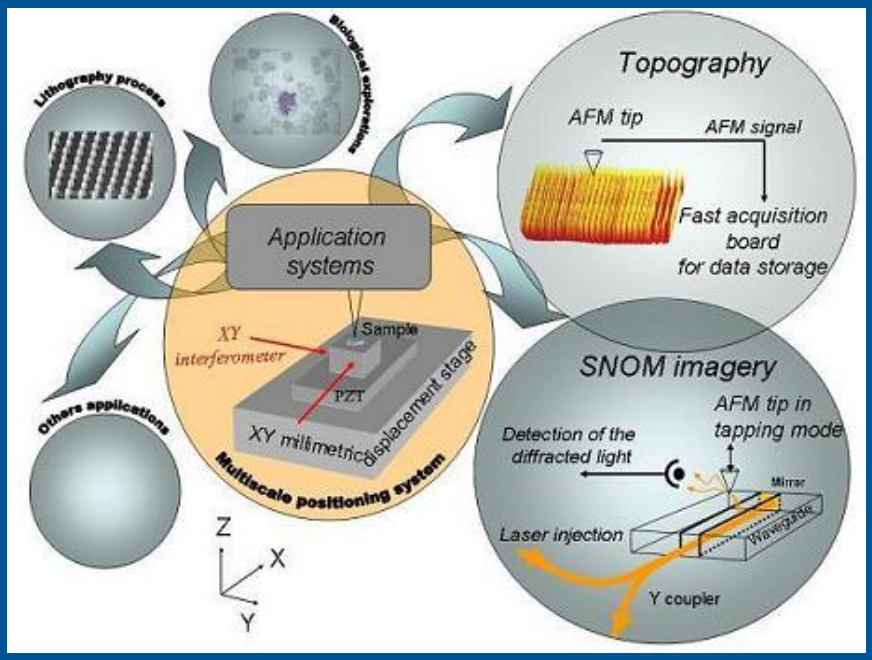

Figure 1: *Aims: Sample-holder stage useful for microscopy, ilhtographie and other applications in nanotechnology*

The project has been closed in 2007 and the deliverable was a prototype. The main resultas are described hereunder.

The Figure 2 shows a CAO view of the prototype of the sample-holder stage which is essentially a blend of commercial motor plates for large displacement, tilts settings and a piezoelectric actuator for precision movement. The sample can be placed on a mirror cube which also serves of moving mirror for the two

interferometers . We use heterodyne interferometers for which we have developed instrumentation and a specific high-frequency electronics servo to get the metrological properties.

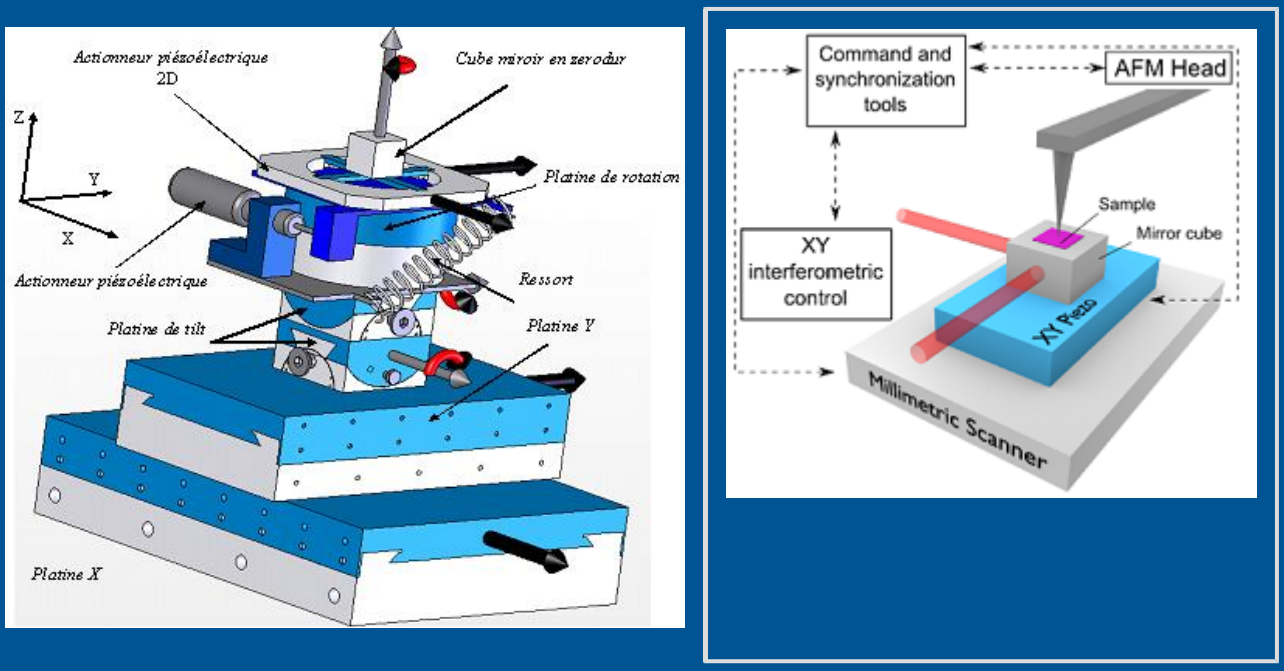

Figure 2: CAO view of the sample-holder stage composed of linear motors and piezoelectric actuators. The whole stage is mounted with two interferometers and lock-in systems for the control of the position, and associated with a atomic force microscope head in this example.

The Figure 3 shows an example of a motion accurately controlled with uncertainties at the order of nanometer.