

comprising a pair of gloves 347 permitting a user outside the glove box loading system to manipulate items inside the glove box loading system without interrupting the hermetic seal provided by the plate 342 which is removable from the scanning probe microscope. Inert gas may be passed through the glove box 346 by means of the gas supply lines 348, 350. A similar pair of gas supply lines 352, 354 permits gas flow through the glass chamber 344 when it is in place. The gas supply lines 348, 350, 352, 354 may be shut off by means of corresponding gas valves 348a, 350a, 352a, 354a when not in use. A detailed section is shown in FIG. 22. The microscope body 340 is pushed into the plate 342 where it is retained by an O-ring 356. The plate 342 seats against the glove box 346, to which it is affixed by bolts 358a, 358b. Magnets 360 pull a magnetic ring 362 up against the plate 342. The glass chamber 344 is affixed to the magnetic ring 362. Thus, the glass chamber 344 may be easily pushed into place and retained by the magnets 360.

The plate 342 is first bolted into place on the glove box 346 and the microscope body 340 inserted into the plate 342. The gas supply lines 352, 354 through plate 342 are sealed with valves 352a and 354a and inert gas flowed through the glove box 346 using the gas supply lines 348 and 350 until the glove box 346 is purged of oxygen and other undesired gasses and vapors. At this point, the sample can be prepared, placed on sample platen 364, and sample platen 364 mounted to the microscope 340 in the inert atmosphere maintained by glove box 346. Once the sample platen 364 is mounted to microscope 340, the glass chamber 344 may then be placed into position on the plate 342 and gas flow started through the gas supply lines 352, 354. The plate 342 may now be unbolted from the glove box 346 with the sample protected inside the glass chamber 344. The microscope, now resting on the glass chamber 344 to which it is sealed, may now be placed into an enclosure for high resolution microscopy. With long gas lines 352, 354 connected to the chamber 344, this enclosure can be situated remotely from the glove box 346 in operation. For low resolution microscopy, when acoustic isolation of the microscope is not so important, the microscope may be operated in-situ in the glove box 346.

Sample Platen with Adjustable Kinematic Mounts

The sample platen described in U.S. patent application Ser. No. 08/388,068, supra, is translated by means of adjustment pegs which locate in slots in the sample platen. However, it is sometimes desirable to be able to remove and replace the sample platen while retaining its position with respect to the microscope tip. For example, a very small sample might be used and positioned with the use of an optical microscope. It would be desirable to be able to remove and replace the sample platen with no loss of alignment. FIG. 23 shows an arrangement which permits this. The sample platen 366 mounts onto the magnetic balls disposed at the ends of threaded vertical adjustment rods by means of the cone 368 vee-groove 370 and plane bearings 372 which form a standard kinematic mount, allowing precise removal and replacement of the sample platen 366. In order to allow adjustment of the tip with respect to a sample mounted on this platen 366, the vee groove 370 is made adjustable. It is formed into a piece 374 which slides in a slot 376 in the platen 366. The sliding piece 374 is locked into position by means of two bolts 378, 380 which slide, respectively, in slots 382, 384. In the microscope, the tip is located over the sample in one direction of movement by sliding the vee-groove 370 in its slot 376. It is then locked into place with the bolts 378, 380. The perpendicular adjustment is achieved by rotating the scanner in the body of the microscope.

Alternative Embodiments

Although illustrative presently preferred embodiments and applications of this invention are shown and described herein, many variations and modifications are possible which remain within the concept, scope, and spirit of the invention, and these variations would become clear to those of skill in the art after perusal of this application. The invention, therefore, is not to be limited except in the spirit of the appended claims.

What is claimed is:

1. A scanning probe microscope comprising:
 - a frame;
 - a positioning scanner attached to said frame;
 - a scanning probe coupled to said positioning scanner;
 - at least three support members engaged with and passing through said frame;
 - a cover attached to said frame with a hinge;
 - at least one of said support members engaged with a mechanical actuator disposed on said cover; and
 - a sample stage disposed in a stage plane below said scanning probe, said sample stage is removably attached to said support members;
 - said mechanical actuator provides a drive in a direction generally orthogonal to said stage plane to said at least one of said support members so as to control a distance between said scanning probe and said sample stage.
2. A scanning probe microscope according to claim 1 wherein said mechanical actuator is a motor and said motor is engaged with said at least one of said support members through a magnetic clutch.
3. A scanning probe microscope according to claim 1 further comprising a chamber removably attached to said frame for surrounding and encapsulating said sample stage.
4. A scanning probe microscope according to claim 3 further comprising a glove box loading system removably attached to said microscope and to surround and hermetically seal a volume containing said chamber, said glove box loading system including:
 - sealing means for hermetically sealing said glove box loading system to said scanning probe microscope, said sealing means being removable from said scanning probe microscope and
 - glove means permitting a user outside said glove box loading system to manipulate items inside said glove box loading system without interrupting the hermetic seal provided by said sealing means.
5. A scanning probe microscope comprising:
 - a frame;
 - a positioning scanner attached to said frame;
 - a scanning probe coupled to said positioning scanner;
 - at least three support members engaged with and passing through said frame;
 - a cover attached to said frame with a hinge;
 - at least one of said support members engaged with a mechanical actuator disposed on said cover; and
 - said support members rest on a surface to be scanned, said surface being generally in the shape of a plane;
 - said mechanical actuator provides a drive in a direction generally orthogonal to said surface to said at least one of said support members so as to control a distance between said scanning probe and said surface.
6. A scanning probe microscope according to claim 5 wherein said mechanical actuator is a motor and said motor is engaged with said at least one of said support members through a magnetic clutch.