

Scanning Probe Microscope – Bruker Dimension ICON


Troubleshooting

Attention: Login to PC windows using the username and password shown with the label on the PC monitor.

All the users are expected to properly treat the device and in case of minor issues, follow the troubleshooting guide. Below the most typical issues with Dimension ICON are presented. If you still face the problem, contact the guarantor.

Software issues

Various problems might happen during the setup process; e.g. focusing, imaging, illumination. Here you find the most typical issues during setup;

- a. **Frozen software:** It happens once a while that the NanoScope software is frozen and it can't take any action or command. The first and easiest step is to close the software by clicking on  or right-click on the taskbar and open Task Manager\Processes\Apps, highlight the NanoScope software, and click on End Task. After a few seconds, reopen the software and check the problem is resolved or not.
- b. In most cases, this step works just fine, otherwise, try to restart the computer. After login to Windows, and loading the software, check if the issue is resolved or not.
- c. Again, if you still face the problem, close the software, restart the PC and turn off the SPM controller (below the workstation) and wait for one minute, then turn on the controller back. This time, since you switched off the controller, it will ask you to initialize the stage.
- d. If step c was not helpful, close the software, shut down the PC and turn off the controller. Wait about 2-3 minutes and turn on both the PC and controller again. Launch the software and most probably the issue is already gone.
- e. In case, after step d, you still face problems contact the guarantor.
- f. **Popup errors:** Several errors may popup during measurement. You might get a Crash Protection error while you are far from the sample surface. This is due to that the user removed the prob holder from the scanner head before shutting down the NanoScan software. Because the laser should reflect from the probe to the detector and if you already removed the probe holder, the software will realize it as a wrong tip-to-surface distance and gives you an alarm.
- g. If you still are not able to fix it, contact the lab staff.

Setup issues

The NanoScope software usually works fine for the majority of the measurements, however, some problems in the software have been observed which I mention them here;

- a. **Probe mounting:** Zoom out on the optical image and make sure if the tip is in the right $\frac{1}{4}$ of the screen. If it is NOT, then perhaps there was a problem while mounting the probe. Though, try to unmount and remount the probe on the probe holder properly.
- b. **Probe focusing:** In some cases, the probe seems to be out of focus. The sample surface will be in focus when the tip is 1 mm away from the surface; i.e. where the NanoScope software is adjusted by default to start engaging. The objective lens is automatically adjusted when moving to the Alignment Station. There, the silhouette of the tip is visible and if it is not, adjust the Focus Control buttons until you see it and then align the laser. Sometimes once you return from Alignment Station, the objective lens is not adjusted automatically and you don't see the image of the tip in color mode. To fix this, adjust the Focus Controls until you see it and then position the red cross on the position of the tip. Now, if the tip is in focus, it means that during the navigation, the tip will be automatically setup to be positioned 1 mm away from the objective lens focal plane and then the tip-to-sample distance is 1 mm when the surface of the sample is in focus.
- c. **Alignment station:** It may rarely happen that the stage does not move to the alignment station or after moving, it focuses somewhere farther than the cantilever (defocus). Then the error log "Error: Could not move to the Alignment Station" may appear. To correct this issue, first, try to restart the program and even maybe the whole

system. If you still face the problem, you may manually focus and align the laser. Other than this, when selecting the experiment, you can try a different mode than what you meant to perform and do the alignment, then switch back to your original mode. In none of these methods help you, contact the lab staff.

- d. **Visualizing the sample:** In some cases, finding the sample surface is problematic. Here is my proposal to fix it. First, make sure the “manual light control” knob, located in front of the dimension controller, is adjusted properly. Tuning the “illumination” under the “Navigate” tab may also help by providing proper flux of light to the surface. Then you can use “focus controls” to find the surface.
- e. If you still are not able to fix it, contact the lab staff.

Engage issues

Several issues may disallow you to engage the probe. Most common problems are;

- a. **False engage:** If the “Tune Cantilever” is not performed properly, it might prevent the smart engaging of the probe. This is due to that the system confuses the optimal resonant frequency of the probe. The standard engage is not using the resonant frequency of the probe, thus, you can switch to “Standard Engage” in Microscope\Menu\Engage Setting\Engage Mode setting and see if it works or not. After this, if you’re unable to engage, try to relocate the probe (due to insecure touching of the sidewalls) and if you still have a problem, change the probe.
- b. **Low RMS amplitude:** During the smart engage, you may face a popup error “RMS amplitude is too low for Smart-Fast engage”. Change to Standard engage to see if it works or not.

Scan issues

During the scanning, either in ScanAssyt or Tapping mode, the following issues are most typical;

- a. **Feature copy:** This is a very common problem in most of the probes, where an external object such as dust or any other particle is attached to the tip. In such a situation use another tip and inform the guarantor about the situation to clean the tip.
- b. **Problem with force curve:** Unlike TappingMode™, where imaging force is a complex function of the setpoint and other variables, Peak Force Tapping provides direct force control. This allows it to operate at even lower forces than TappingMode, which helps protect delicate samples and tips. If you don’t see the normal force in this mode, perhaps the tip is just oscillating above but not touching the surface of the sample. This can be solved by decreasing the “peak Force Amplitude”. The maximum value is 150 nm, where a small value is recommended for smooth or flat surfaces while higher values are better for rough samples.
- c. **Scanning problem:** If you see the scanning is performed in an undesirable action, and you are not sure whether the problem is due to a microscope or sample, try to remove your sample and scan a standard sample. If it works for the standard sample, probably you need to change the scan details for your sample. If there is a problem while scanning the standard sample, most probably there is something wrong with the microscope and you should contact the guarantor.

If you face any issue, other than those listed above, please record it as a screenshot and contact the staff.