

Nano  
Fabrication  
Center

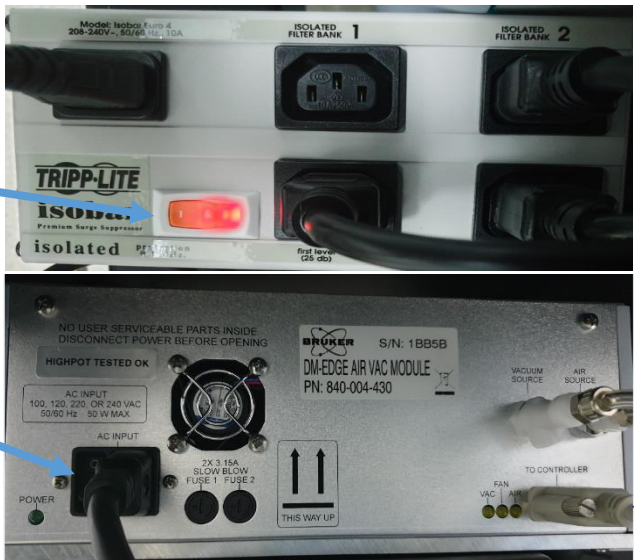



# Atomic Force Microscopy

Standard Operating Procedure

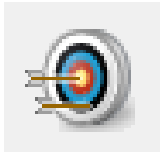
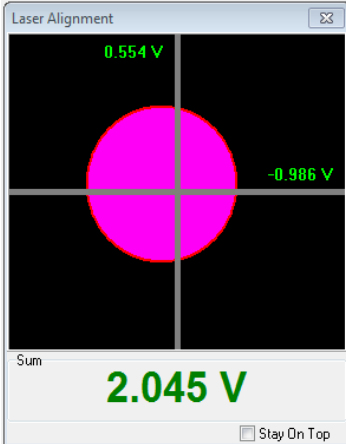
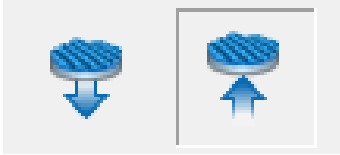


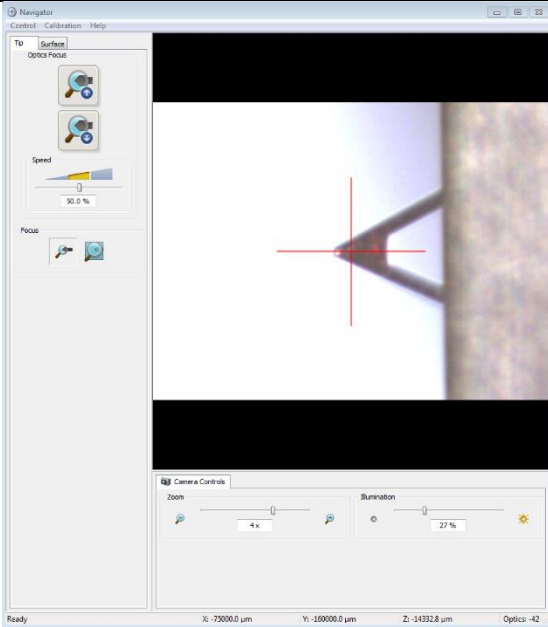
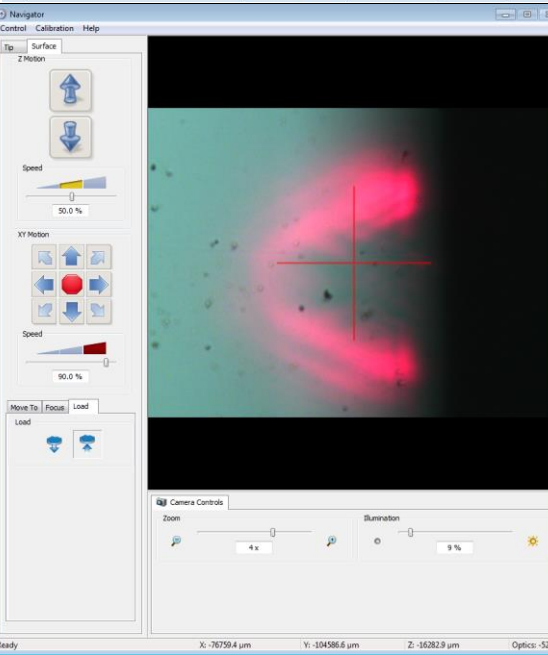
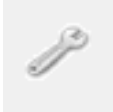

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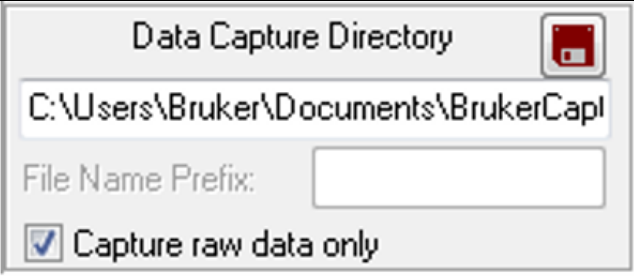

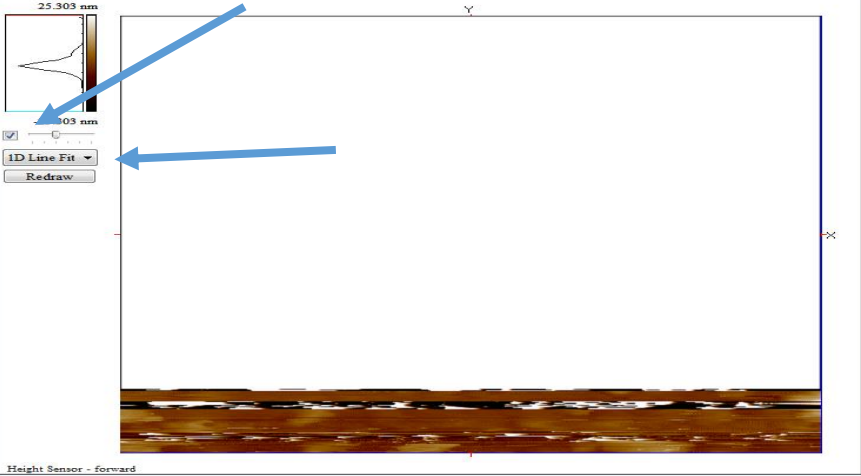
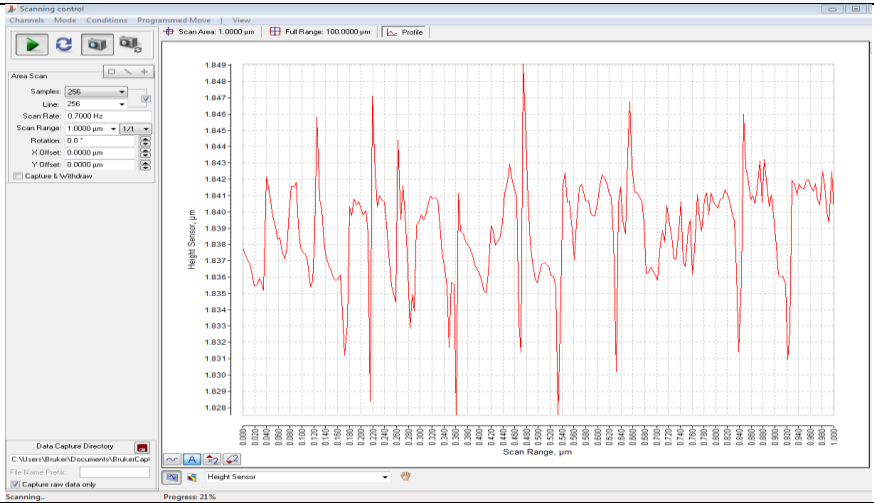
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<p>1</p>	<p>Turn ON the red electrical switch  Turn ON AFM instrument  Turn ON AFM computer (this order)</p>	<div> <p>Electricity</p> </div> <div> <p>AFM instrument</p> </div> 
<p>2</p>	<p>Select NanoDrive v8.06 icon</p>	
<p>3</p>	<p>Select mode of operation (Contact/Tapping/ Peak Force Tapping).  If you want to change mode later  select <b>Microscope</b>   &gt; <b>Profile</b></p>	
<p>4</p>	<p><u>Mount Probe</u></p> <ol style="list-style-type: none"> <li>1. Release screw from scanner and take it out-pull up.</li> <li>2. Take out the cantilever holder (be careful not to touch the tip) and place it on the multiple holder cantilever stage.</li> </ol>	 <div> <p>Scanner  Bruker Site</p> </div>



	<ol style="list-style-type: none"> <li>3. <b>Insert cantilever</b> gently (usually the tip is at the top side of the cantilever).</li> <li>4. <b>Take out</b> the cantilever holder and place it back to the scanner, tip side is to the left.</li> <li>5. <b>Align the laser</b> on the tip by turning the X and Y knobs of the laser and looking on its deflection on the black table (once the laser spot is on the tip it should look as a split spot, then you should optimize the sum see section 5).</li> <li>6. <b>Screw</b> the scanner back.</li> </ol>	
5	<p><u>Align Laser</u> Press the Laser Alignment icon and center on the tip by turning the X and Y knobs of the laser (at the top of the Scanner) to get maximum sum value.</p>	
6	<p><u>Adjust the Photodetector</u> <b>Turn the X and Y knobs</b> of the photodiode (at the side of the Scanner) to center the laser (pink dot) at the center of the square (photodetector). Signal should be about 2V.</p>	
7	<p><u>Insert surface</u> Put sample on the stage and <b>turn ON</b> the sample vacuum. Sample should be as clean as possible! In the navigator window, set on the <i>surface</i> bar and <b>press</b> the load icon.</p>	

<p>8</p>	<p><u>Locate Tip</u> In the navigator window, <b>set</b> on the <i>tip</i> bar. <b>Focus</b> on the tip (using up and down arrows) and <b>set</b> the cross on the edge of the tip.</p>	
<p>9</p>	<p><u>Focus Surface</u> In the navigator window, <b>set</b> on the <i>Surface</i> bar. Focus on the surface (using up and down arrows- by doing so you are changing the distance between the tip and the surface). The optics will move to a focus 1 mm below the tip, so once the surface is in focus it is 1mm below the tip Make sure the tip does not hit the sample surface while you are trying to focus on the surface!</p>	
<p>10</p>	<p>If you are using ScanAsyst mode check in the ScanAsyst Control</p>  <p>that the Force Amplitude is 0.15 before engaging the surface. It is recommended to start engaging with auto gain and set point.</p>	
<p>11</p>	<p><u>Engage-Press</u> the Engage icon</p> <p>After engage is done, <i>Scanning control</i> window will open.</p>	

<p>12</p>	<p><b>Change the path</b> of the <i>Data Capture Directory</i>. Please save your files before you scan..</p>	
<p>13</p>	<p><b>Select</b> play icons to start the scan and camera icon to capture the image at the end of the scan. This way the system will pause scanning at the end of each scanned image. If you press the round blue arrows the system will scan continuously</p>	
<p>14</p>	<p><u>Surface image alignment-</u> <b>Tick</b> the v on the channel fit box- so the system will adjust the optimal z scale and <b>choose</b>, for example, 1D Line fit.</p>	
<p>15</p>	<p>In the <i>Profile</i> tab make sure the trace and retrace are tracking each other. If they are not tracking well, adjust the <b>scan rate</b>, <b>gains</b> or <b>setpoint</b> to improve tracking. If the scan is too noisy decrease the gain.</p>	

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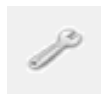
When you use scan assist mode In the Force Monitor window



make sure the curves looks like this, you should make sure the tip comes in and out of the surface as indicated by the baseline.



Else, you should change tip or get further from the surface every retraction by changing the Peak Force Amplitude in the ScanAsyst Control.



This should be checked to be 0.15 μm before engaging the surface.

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Withdraw-Press the Withdraw icon

In the navigator window, **set** on the *Surface* bar. Use the up arrow to increase the distance between the tip and the surface.

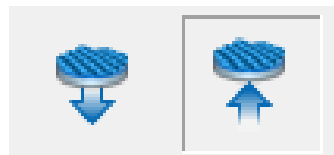


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Take out the surface

In the navigator window, set on the *surface* bar and **press** the unload icon.

**Turn Off** the sample vacuum and take out the sample.



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Close all programm windows.

**Turn OFF** AFM computer  
**Turn OFF** AFM instrument  
**Turn OF** the red electrical switch (this order)