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Protocol for Scanning electrochemical microscopy

Department of Health and environmental sciences

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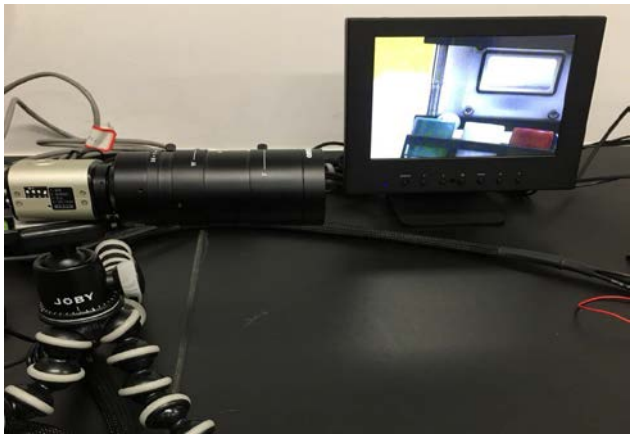
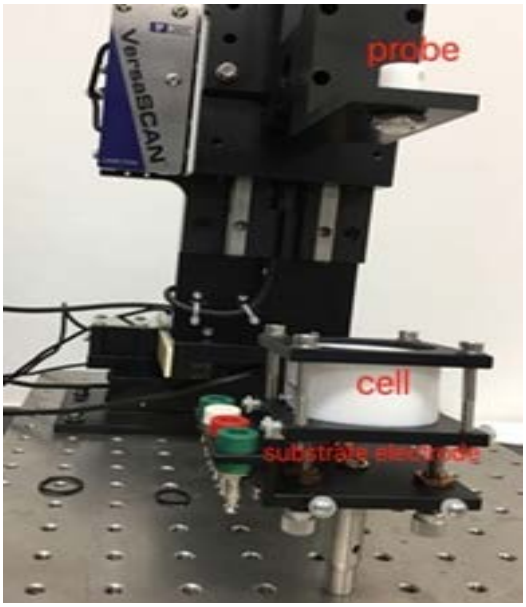
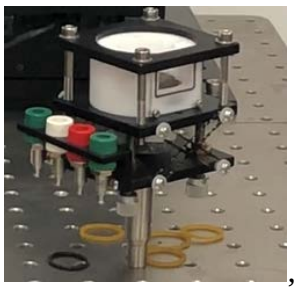


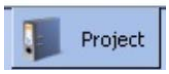
Camera-Aided system



Micro-motion platform

Motion Controller

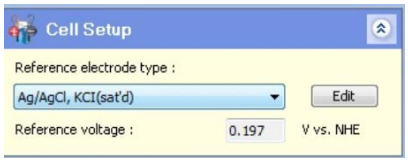
1. Check the power for all three parts (motion controller, micro-motion platform, and camera-aided system) of SECM system, and check the height of Z-beam on the micro-motion device (about 10 cm from the reaction cell).
2. Install the substrate electrode and fix the reaction cell on the Micro-motion platform  , and make sure the transparent window face to the camera.
3. Open the computer and open software VersaScan Par.ico

4. Build “New Experiment”. Click 

, and then  .

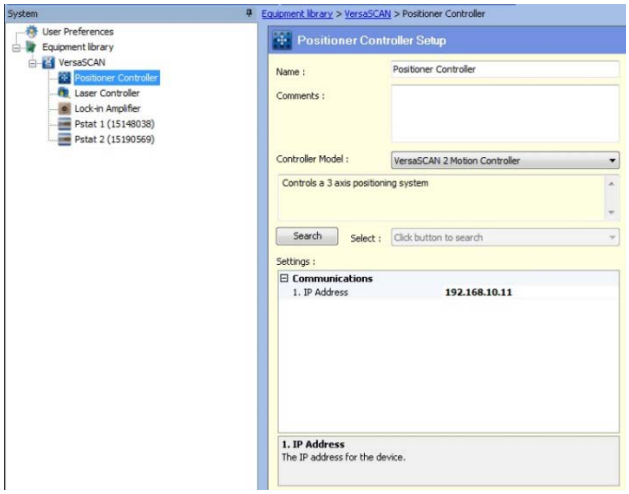
5. Hardware connection check and setup. Click Setup in “New Experiment”. In the Hardware Requirements, the “Probe Pstate” usually select VersaSTAT 3F.

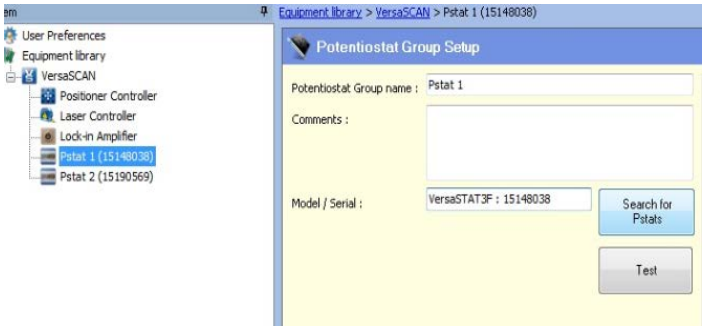
In the Cell Setup, select the reference electrode you use (e.g. Ag/AgCl).



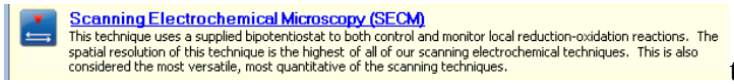
What if the “Probe Pstat” is not found, click “System” 

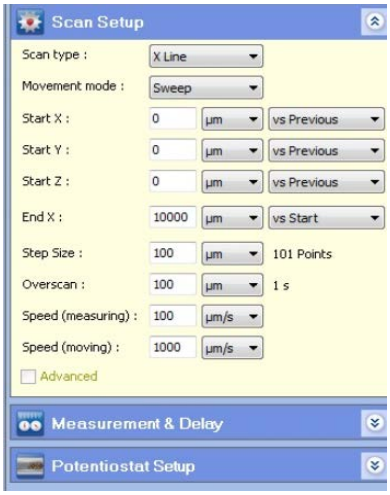
to check the connection between machines and computer. You can click “Search” to examine machine connected to software, and then click “test” to examine the connection. Any failure connection, examine the data connection wires between machine and computer (white USB wires or cable wire).



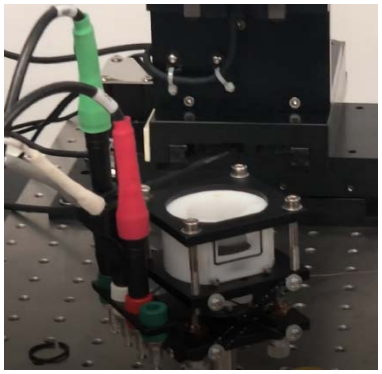
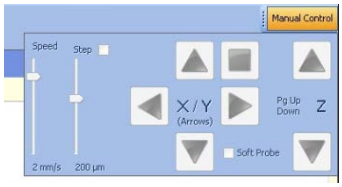


6. Click Step and select “Scanning Electrochemical Microscopy (SECM)”,



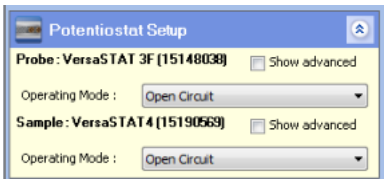
then click “Scan Setup” to set all the parameters value. 

(Step Size value determine the resolution of the scanning image; Overscan could be equal to Step Size usually; Speed(measuring) should be no less than Step Size; Speed(moving) is usually large than Speed(measuing). You also can refer to textbook or specification for machine).

7. Connect wires (electrochemical workstation connecting substrate electrode) to reaction cells or probe. Red (tip with CE) wire to red connector, white (tip with RE) wire to white connector, green (WE) and gray (merge into one) wire to green connector. 
8. Connect wires (electrochemical workstation connecting probe electrode). Green (tip with WE) wire to the probe electrode, the red wire to the red connector, and the white wire to the white connector.
9. Manual Adjusting probe position to the fine position and height by click the proper arrow 

(usually no more than 100 um above from the substrate electrode). After positioning at fine point for your experiment, set the Start x, y, z to 0 (figure in 6) respectively. Be cautious the motion speed and distance when the probe is close to substrate

electrode (sample). In this step, operator needs to control the z-beam motion manually by using camera-aided system.

10. Click “Potentiostat Setup” to set “Operating Mode” and relevant parameters (potential or current) for scanning study. 

11. Return the Z-beam to origin height.
12. After saving the data, you also can save the project for later use without setting the parameters.
13. Close the software and turn off the machines and cut off power.