VersaStudio

Software Demonstration Guide

Rev A 0214

Purpose:

VersaStudio software combines ***functionality*** – it is used to control various Princeton Applied Research potentiostats/galvanostats (VersaSTAT series, PARSTAT 4000 and PARSTAT MC) – ***ease-of use*** – it offers flexible experimental setup, simple data comparison and convenient data analysis and fitting routines – and ***accessibility*** – it is free to download from our website without the need for registering. This demonstration guide is designed to highlight this fact, as well as the various capabilities of the VersaStudio software. Keep this in mind during the demonstration and continue to emphasize the versatility and simple operation of the software. Items that appear in **BOLD** are particularly notable features that differentiate VersaStudio software from other programs.

What you will need before getting started:

Software only demonstration

- A computer with the following:
  - The latest version of VersaStudio, including the example .PAR files that accompany the software
  - A recent version of Adobe Acrobat to view the software and hardware manuals

System demonstration

- A computer with the following:
  - The latest version of VersaStudio, including the example .PAR files that accompany the software
  - A recent version of Adobe Acrobat for viewing the software and hardware manuals
- A potentiostat with the latest firmware
- Cell cable, power cable, USB cable and alligator clips
- External dummy cell or a resistor (we recommend 1 kΩ)

☐ Step 1: Explore the Help window

☐ Manuals

- PDF versions of all manuals, including those for software and hardware, are available here
- Note that the VersaStudio manual is also available, upon request, in other languages, such as Russian and Chinese

☐ Check for Latest Updates

- Note the importance of always using the most up-to-date version of the software/firmware

- Note that *Normal* means grounded, which is always the default
- Note that floating instruments offer additional Notch Filter and EIS filter options

- If the user enables *Automatically Save Data File*, the date and time stamp of a file will automatically change whenever the file is opened, whether or not changes were made
  - If this feature IS NOT enabled, the user will be prompted to save a file whenever it is closed, allowing the user to control whether or not the date and time stamp changes
  - If this feature IS enabled, the user must use caution to avoid inadvertently losing data which was intended to be saved
- If the demonstration is being conducted for a PARSTAT 4000, note the *LCD Display* tab and the ability to customize the front panel display

Explain when to use the *Calibrate Now* function (only calibrate after the instrument has been powered-on for at least 10 min):

- If the Voltammetry Checkout produces a Y-intercept outside of +/- 4 mV (Manual, P. 16)
- After switching the Float Settings mode
- After removal of a low current interface
- If the instrument has been commissioned for some time

☐ Virtual Potentiostat

- Go to Tools/Virtual Potentiosat and explain that this feature can be used by the:
  - User to perform basic actions such as applying a DC potential or current or an AC sine wave without running an actual experiment
  - User for monitoring E and I readings in real-time
  - Technical support staff as a troubleshooting tool

☐ Step 4: Start a new experiment

☐ Actions

- Point out the various techniques available to them based on the option purchased
  - Also indicate those available if they should ever choose a system upgrade – system upgrades are easily implemented by going to Help/Upgrade Instrument
- Highlight the following *Advanced Actions*
  - Loop
  - **E-mail**
  - Auto Current Range Setup
  - **Auxiliary Interface**
    - Allows customization for sending or reading a TTL pulse for interfacing with external hardware

- Comments/Notes
- **Limits (Global or Hard) – will end the experiment if limits are breached**
- Properties
  - Physical properties of sample to be used in data normalization
  - Selecting a Reference Electrode type here is simply a notation of the actual reference electrode used in the experiment and is required in order to correctly shift the potential using the Reference Electrode option in the *Graph Properties* window (see below, P. 6)
  - Remeasure OC Per Action
    - Explain that the OC measured at the beginning of each is experiment is reported in the *Common* section
    - Remeasuring OC per action may be critical when applying a potential *vs OC*
- **Help – shows the basic cell cable connections**
  - Ask the customer to setup a two electrode connection to the provided dummy cell or a resistor
  - Point out the importance of always connecting the sense (gray) lead
  - This is a good time to discuss the ground (black) lead
    - If using a Faraday cage, connect to the cage ensuring contact with the grounding post or other conducting surface within the cage
    - Used in making electrochemical noise, zero resistance ammeter and galvanic corrosion measurements
    - Leave disconnected if no earth ground available

☐ Properties and Advanced Panel

Emphasize the following:

- An underlined word indicates there are options to select
  - Note that, for certain actions, Potential can be selected *vs. OC*, *Ref*, or *Previous* – explain how *vs. Previous* works and its utility in designing experimental sequences
- Limits (Soft) – experiment will proceed to the next Action if limits are breached
  - If the Action consists of multiple segments (i.e. CV), the experiment will proceed to the next segment (see the description of Limits within the *Common* section above)
- Cell properties
  - Cell to use for experiment (external) versus checking instrument functionality (internal dummy cell)
  - Leave Cell ON – note the following:
    - The cell will always be turned off at the end of a sequence if *Cell to Internal at Experiment End* is enabled under Tools/Options
    - If select "Yes," the cell will be left on between actions, which may be desired for the specific experiment
    - The cell should NEVER be left ON between potentiostatic and galvanostatic actions, EIS and DC actions (i.e. AC and DC), or two galvanostatic actions set

- Select method of visual data reduction – this can be used to speed up graphing when performing experiments with a large total number of data points
    - Note that this could obscure data and even possibly lead to misinterpretation
    - Note that the data are still collected and available at any time
- Select data columns to be displayed in the Data View window
- Adjust the order of the columns
- *Comment* column, if not blank, will display "Overload", "Code 01" or "Code 02"
    - "Overload" and "Code 01" suggests that the data point should be considered inaccurate
    - All 3 comments are explained in detail in the manual – this a good opportunity to open up the manual and demonstrate how to easily search for a keyword (i.e. search "Code 01")
    - Note that an I Overload will always be highlighted in yellow

☐ Overlay Manager

Show how to:

- Overlay previously collected data
- **Use live overlay to view data being collected on a different potentiostat**
- Note that any overlaid file included when the primary file is saved, is also saved within that primary data file as a link
    - If the location of the overlaid file is changed, the primary data file will not be able to locate the overlaid file and it will no longer appear on the graph

☐ Multichannel Groups

Explain the following:

- **Multichannel groups allow synchronization of the start of multiple potentiostats**
- Each instrument requires that a setup file be added before a group can be started
- An instrument is added by clicking on the instrument label (blue bar), which will turn it yellow
- The data files will be appended with the respective instruments' serial number

☐ Step 5: Data Analysis

Continue using the "CV 100 Example.par" file that comes with the software (*C:/My Data/VersaStudio/Data*)

☐ Analysis in VersaStudio

Show the customer how to:

- Select data (left-click and move mouse or go to Data / Select All)

☐ Analysis Using ZSimpWin

Show the customer how to:

- Copy data from VersaStudio and paste into ZSimpWin
- **Select and add a model using automatically generated or user defined parameters**
- Copy an image of the model circuit
- View, print and copy results
- View a Nyquist and Bode plot
- **Add frequency labels to a Nyquist plot – Note the convenience of this feature**
- Register the software – which must be done within 30 days to avoid loss of certain functionality

IF ONLY PERFORMING A SOFTWARE DEMONSTRATION, THIS COMPLETES THE PROCESS. IF DOING A SOFTWARE DEMONSTRATION WITH AN INSTALL, PROCEED TO STEP 6.

☐ Step 6: Instrument Checkout

Using the internal dummy cell first, followed by an external cell (if available) or a resistor, perform the Voltammetry and Impedance Checkout if the customer has purchased the impedance option; otherwise, only perform the voltammetry checkout. Perform the Corrosion Checkout, if that is the only option purchased.

- Details are explained in the manual
- Perform DC calibration and then run the checkout procedures, noting the importance of calibration when an instrument has been out of use for some time, when switching between *Floating* and *Normal Mode* and when disconnecting the VersaSTAT LC (i.e. LCI)
    - Note that the instrument should be powered on for > 15 min. to allow thermal equilibration and that calibration typically takes between 3 and 10 minutes

☐ Step 7: Demonstrate an Application Relevant to the Customer

Based on the intended use of the instrument, demonstrate an Action requested by the customer

- If time permits and a commonly used and/or well characterized experimental cell is readily available and deemed safe to operate, it should be used
- Otherwise, an external dummy cell can be used
- Note that performing impedance measurements on an experimental cell is not recommended unless the researcher is experienced with EIS, as it is difficult to interpret without specific knowledge of the users processes
    - In this case, use of an external dummy cell is preferred