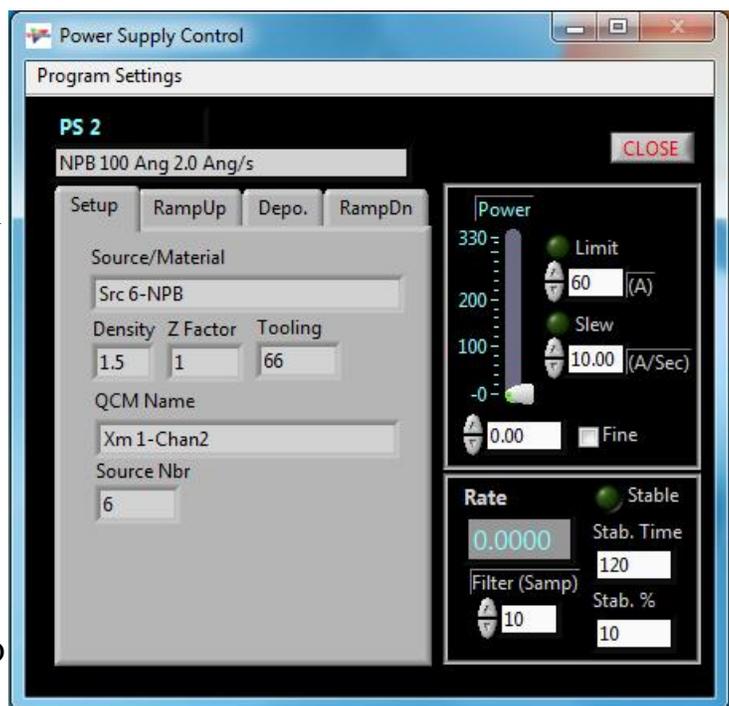


## Power Supply Control

Power Supply Control controls the amount of power that is delivered to a source in the chamber that contains a material. The source, and thus the material that will be used for a deposition with a power supply, is selected on the Main Panel. If your system is equipped with a High Current Switch (HCS), launching the power supply window activates the appropriate HCS for the selected source. The desired settings for a particular material can be named and saved in a database for reuse. Named settings can be created using the Program menu selections: Load, Save, Save As, Delete, and Rename. Load will read in the parameters that were saved previously. Save will save the new values to the current setting name. Save As will create a new setting with the name selected by the user. Delete will delete the settings from the list. Rename allows the user to change the name of a saved setting. These settings can be pre-selected from the main panel.

The right-hand portion of the Power Supply Control panel contains controls that are used through-out the evaporation process. The Power control bar is used to monitor and control the electrical current (in Amps) that is being directed to the source. The Power level is shown as a green bar. Under certain conditions, a red bar will indicate that requested current has exceeded the Material Power Limit and/or Slew limit. The LED above the Limit control indicates that the Material Power Limit is being exceeded when bright red. The LED above the Slew control indicates that the Slew rate limit is being exceeded when bright red. The Slew limit controls how quickly the power is allowed to change in A/Sec (amps per second). Slew control can be very important while under PID control to prevent wild swings in current due to crystal or material misbehavior. The



Increment/Decrement button for the Power control will normally bump the Power Up/Down by 0.1 amps. Selecting the Fine check-box changes that increment to 0.05 amps. The Rate indicator shows the FILTERED deposition rate. The Filter (Samp) control overrides the Filter Length as originally defined by the QCM database dialog. There is a Stable LED that indicates that the rate has stabilized as defined by the Stab. Time and Stab % controls. Stab. Time defines the amount of time that the rate remains in a band of plus or minus Stab. % of the programmed Target Rate. The left hand side of the screen contains a tab control with tabs that corresponds with the various phases of the deposition process. Those phases being material Setup, power Ramp Up (pre-conditioning), Deposition, and power Ramp Down (post-conditioning).

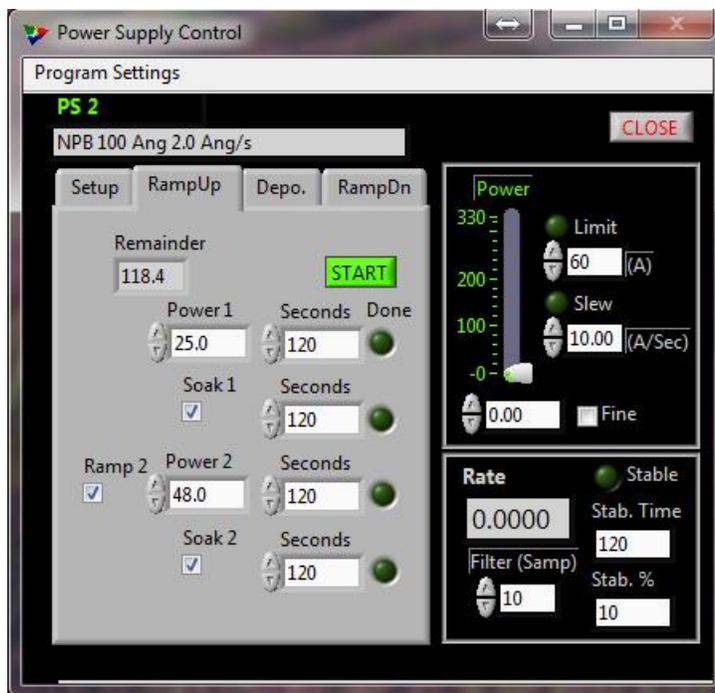
### Setup

The above diagram highlights the Setup tab which is an information screen that shows the selections that have been made for the deposition process. It shows source, material, and QCM information that is being used in the process.

## Ramp Up

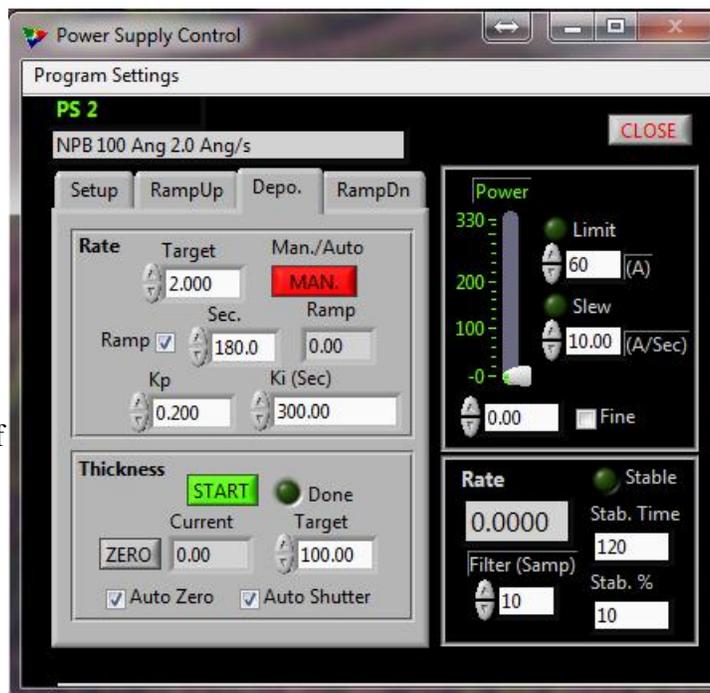
The Ramp Up tab is used as an automated ramp-soak sequence to slowly bring a boat up to evaporation temperature. One ramp stage is default, with two Soak and another Ramp cycle being optional. The first ramp starts at the current Power level and then incrementally ramps to the Power 1 setting in the amount of time indicated in the Seconds control. The Done LEDs next to the Seconds controls show bright green to indicate that a particular phase is complete. A check in the Soak 1 check-box indicates that a Soak cycle is to commence at the conclusion of the first ramp. A Soak cycle merely holds the Power at a given level for the number of Soak 1 Seconds indicated. A check in the Ramp 2 check-box indicates that a second ramp cycle will commence upon completion of Soak 1 if selected or Ramp 1 if Soak 1 is not selected.

Ramp 2 will increase/decrease power from Power 1 to Power 2 over the time indicated in the Ramp 2 Seconds control. A check in the Soak 2 check-box indicates that Soak 2 will commence when the previous active cycle is completed. Pressing the Start button begins the programmed sequence of ramp/soak cycles. Once the sequence is started it can be stopped at any time by the red STOP button.



## Depo.

The Depo. (Deposition) tab is used for automatic control of rate and deposition thickness. This tab is organized into two sections: one for Rate and the other for Thickness. The Target control located in the Rate section is the target rate for PID control. The Man./Auto button switches between MAN. (Manual) and AUTO control of the Power. The output of the power supply is under PID (Proportional, Integral, and Differential) control when AUTO is selected. The Ramp check-box indicates the selection of a Rate Ramp during which the Rate commanded for the PID loop will be ramped from the current Rate to the Target rate for the time indicated in the Sec. (seconds) Control. The Ramp control displays the Rate being commanded to the PID loop while the Rate Ramp is in progress. Kp is the gain for the proportional component of the PID loop. Kp can be considered as the band of Angstroms per second which is dominated by proportional gain. Ki is the gain for the integral component of the PID loop. Ki can be considered the time in seconds over which the rate is adjusted for long term error. A Ki value of



zero would normally cause a divide by zero error, but in our case we have used this value to indicate that Ki is not to be used and the control loop will be purely proportional. Trovato Mfg. Inc. has chosen not to implement the differential portion of the PID control.

In the Thickness section of the tab, the Zero button is used to set the Current thickness to zero. The Auto Zero check-box indicates that the Thickness will set to zero when the START button is pressed. The button then changes to a red STOP button. The Auto Shutter check-box indicates that the substrate Shutter will Open when the START button is pressed. If the operator has not pressed the STOP button when the Current thickness reaches the Target thickness then: the Done LED will show bright green, the STOP button will be automatically actuated, and the substrate Shutter will close, if the Auto Shutter check-box is selected. The operator may override the position shutter at any time by pressing the SUBSTRATE SHUTTER button on the Fixture Control window.

### RampDn

The Ramp Down tab ramps the power down from the current level to zero power during the time listed in the Seconds control.

