

# Integrated platform SmartStudio



## 1. Introduction

SmartStudio is a platform that seamlessly integrates various Rigaku software modules involved with operating the SmartLab diffractometer as well as analyzing data obtained from the SmartLab. It enhances the communication between the application software modules and increases ease of use. For example, the data generated from one Rigaku application software module can be sent to another software module with a single mouse click using the Launcher, an interface that serves as the starting point for application software modules. Also, various processes from measurement to analysis are automatically executed by using a recipe function. With the introduction of SmartStudio, data analysis can now be performed much more efficiently with fewer possibilities for operator error.

## 2. Features

### 2.1. Data Browser

The Data Browser manages the data generated by Rigaku software modules. Since only the data related to Rigaku software modules are displayed on the Data Browser, the data of interest are easily located. Since data files are embedded with the owner information, the Data Browser can display only the login user's data (hide the other user's data) by filtering with the username. Also, the Data Browser has functionalities equivalent to Windows Explorer such as Copy, Rename, Search, and so on. As shown in Fig. 1, the Data Browser can display the data in a thumbnail-style, which makes it easier to confirm the origin of the data without launching the analysis software. Launching an application module

after selecting some data in the Data Browser will result in the data automatically being loaded into the application module.

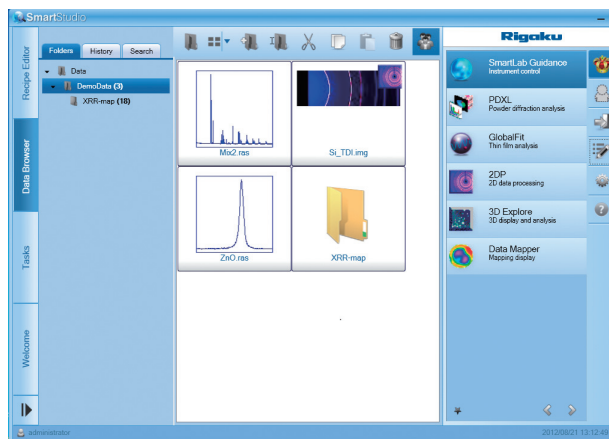


Fig. 1. Data Browser.

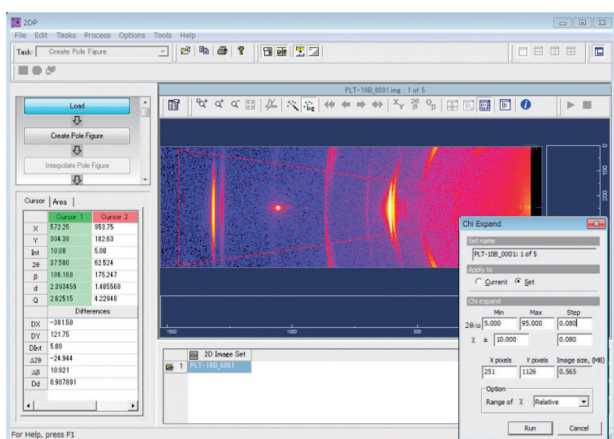
### 2.2. Automatic conversion of 2D data

In the past, to analyze 2D Image data with PDXL<sup>(1)</sup>, the 2D data had to be converted to 1D Profile data using 2DP\*. But now, on launching PDXL from the Launcher of SmartStudio, the selected 2D Image data in the Data Browser is automatically converted to 1D Profile data and is loaded into PDXL. A user can easily start the analysis of 2D Image data with PDXL just by selecting the data in the Data Browser and launching PDXL from the Launcher.

\* 2D Data Processing software

### 2.3. Transferring data to another module

In the automatic conversion from 2D Image data to 1D Profile data, the data is converted using a pre-defined conversion condition. In addition, the 2D Image data can be converted within the 2DP application if the user wants to do something other than the default conversion. This manually converted data can be sent to any of the analysis modules such as PDXL or GlobalFit<sup>(2)</sup> by a single click from 2DP. For example, the axis conversion of multiple 2D Image data with different orientations from each other can be done by 2DP. After that, the converted data can be transferred to 3D Explore\*\* by a single click. Thus, SmartStudio makes it easy to create a wide area reciprocal space map (Fig. 2).



↓ Data is transferred from 2DP to 3D Explore by a single click.

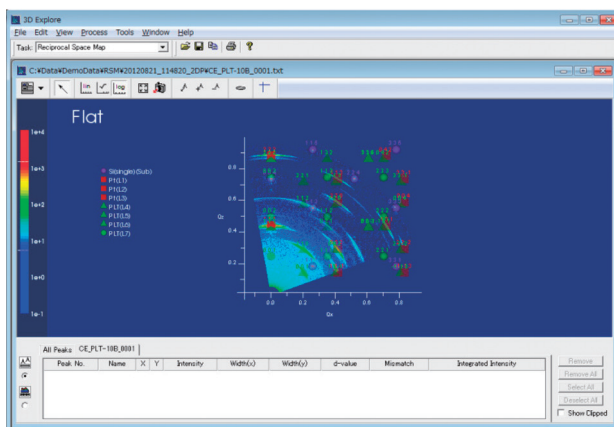
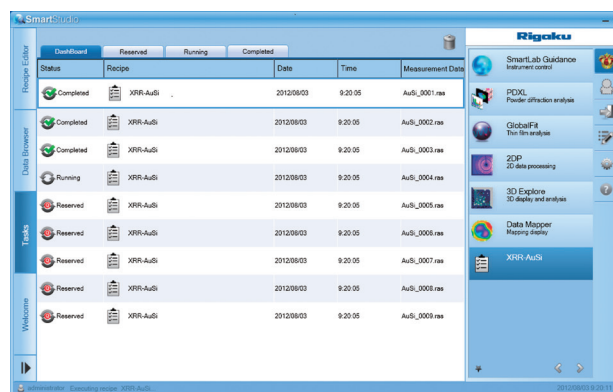


Fig. 2. Data transfer.

### 2.4. Batch processing of multiple data

When a large amount of data is collected using an automatic sample changer or multiple measurements on a single sample (e.g. X-Y mapping measurements of a Si wafer), all of the data can be analyzed with the same analysis conditions by batch processing using the recipe functionality of SmartStudio.



↓ After batch processing, the data is automatically displayed.

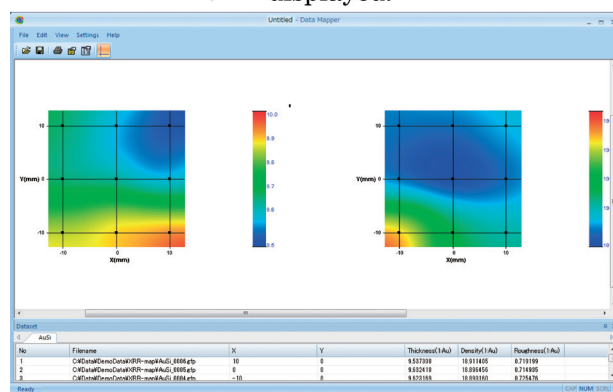


Fig. 3. Batch processing of multiple data and displaying the results with Data Mapper\*\*\*.

### 2.5. Automation from data measurement to analysis results

The macro measurement feature of SmartLab Guidance\*\*\* can be included in the recipe functionality of SmartStudio. By setting some analysis steps after the macro measurement step of SmartLab Guidance, the measurement, analysis, and the display of results are executed sequentially.

### 2.6. Auto login

Some Rigaku software modules have a user authentication mechanism, which requires the user to login by entering their username and password every time they start the software. SmartStudio also has user authentication, but once a user account has been created for SmartStudio, the same user account for all the other Rigaku software modules is created automatically. Once a user has logged in to SmartStudio, authentication to other Rigaku software modules is not required because of the auto login mechanism.

### References

- (1) *The Rigaku Journal (English version)*, **26**(2010), No. 1, 23–27.
- (2) *The Rigaku Journal (English version)*, **25**(2009), No. 2, 25–26.

\*\* 3D display and analytical software

\*\*\* SmartLab control software

\*\*\*\* Mapping display software