Synthesizer Ver. 0.3.1

User's Guide

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Contents

0 Introduction

    a   "Synthesizer" is a tool for making better synthesized images with less missing values from detector output raw images, which include significant unusable pixels inevitable from the detector structure design.

    b   This is a detailed and almost complete operation guide for users, corresponding to the version 0.3.1 of "Synthesizer".

    c   A simpler document is available as "HOW_TO_USE.txt" in the tool installation folder.

    d   It is assumed that you are already familiar with the measurement operations at Photon Factory, KEK.

1 Data Preparation

    a   Prepare the following data in a folder.

- Measured data image files.

   File postfixes are usually appended as follows:

*_0_0000.tif	original data,
*_1_0000.tif	first shifted data,
*_2_0000.tif	second shifted data,

   where * is the measured sample id.

- Measurement log file.
- Pilatus counter file(s).
- SAngler mask file

    b   See the figure below for an example.

    c   For each sample, the tool can synthesize two or three images named regularly after the sample id.

    d   However, it is desirable that, for each sample, you prepare three images with different positioning to get well-synthesized images.

Fig. 1-1　Example of a data folder
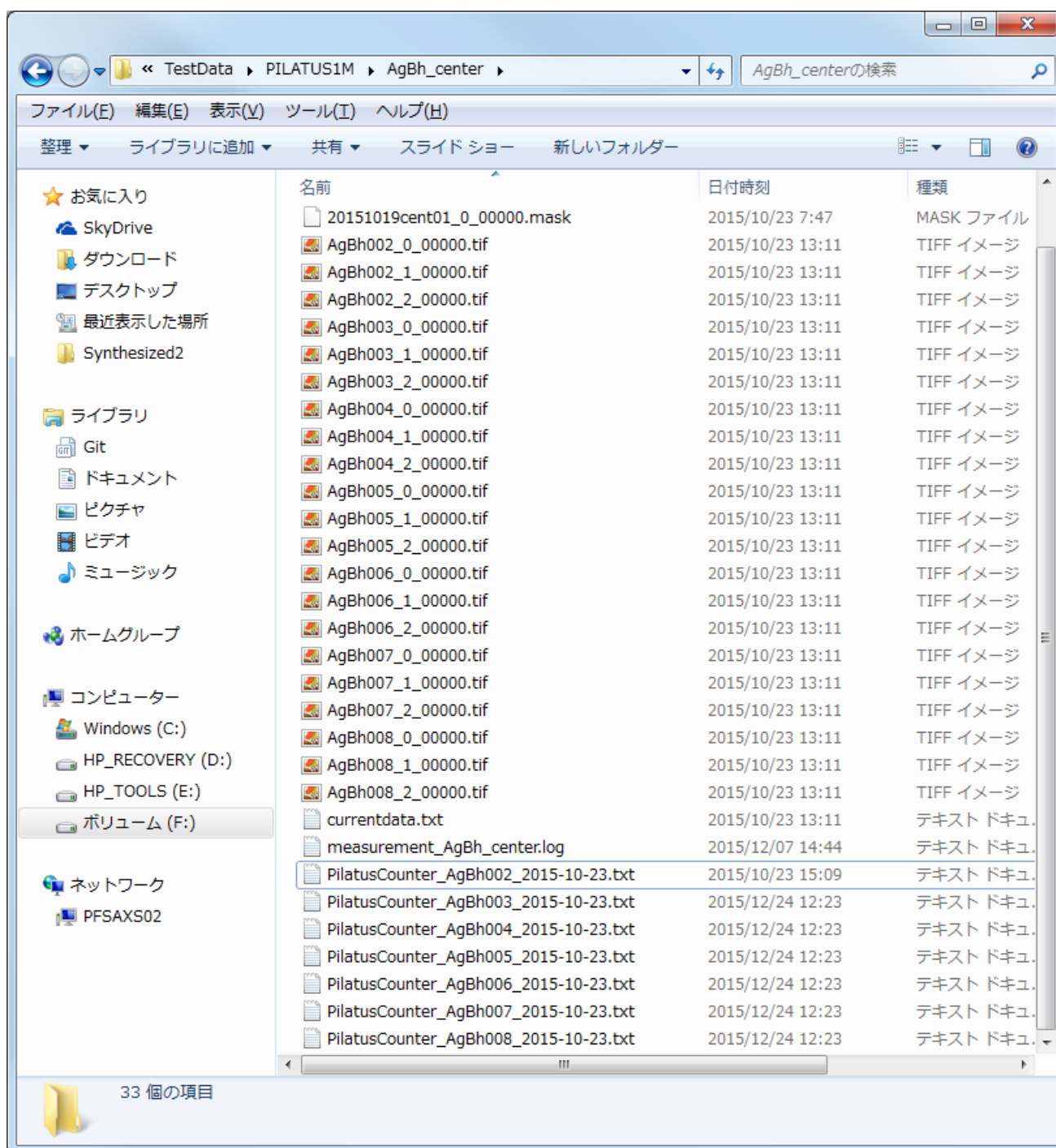
2 Tool Installation

a Download a suitable distribution file from

http://pfweis.kek.jp/~saxs/software/Synthesizer.html

synthesizer-0.3.1-x64.zip （for 64bit Windows）

synthesizer-0.3.1-x86.zip （for 32bit Windows）

b Unzip the distribution file into an arbitrary folder aside from image data folders. No other action is necessary. The folder should look like the figure below.

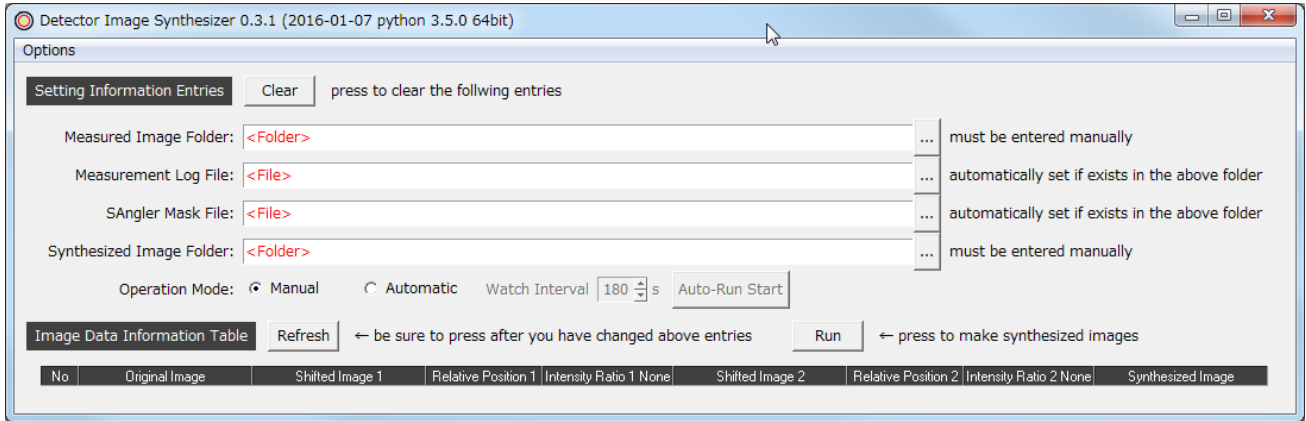**Fig. 2-1 Example of a tool installation folder**
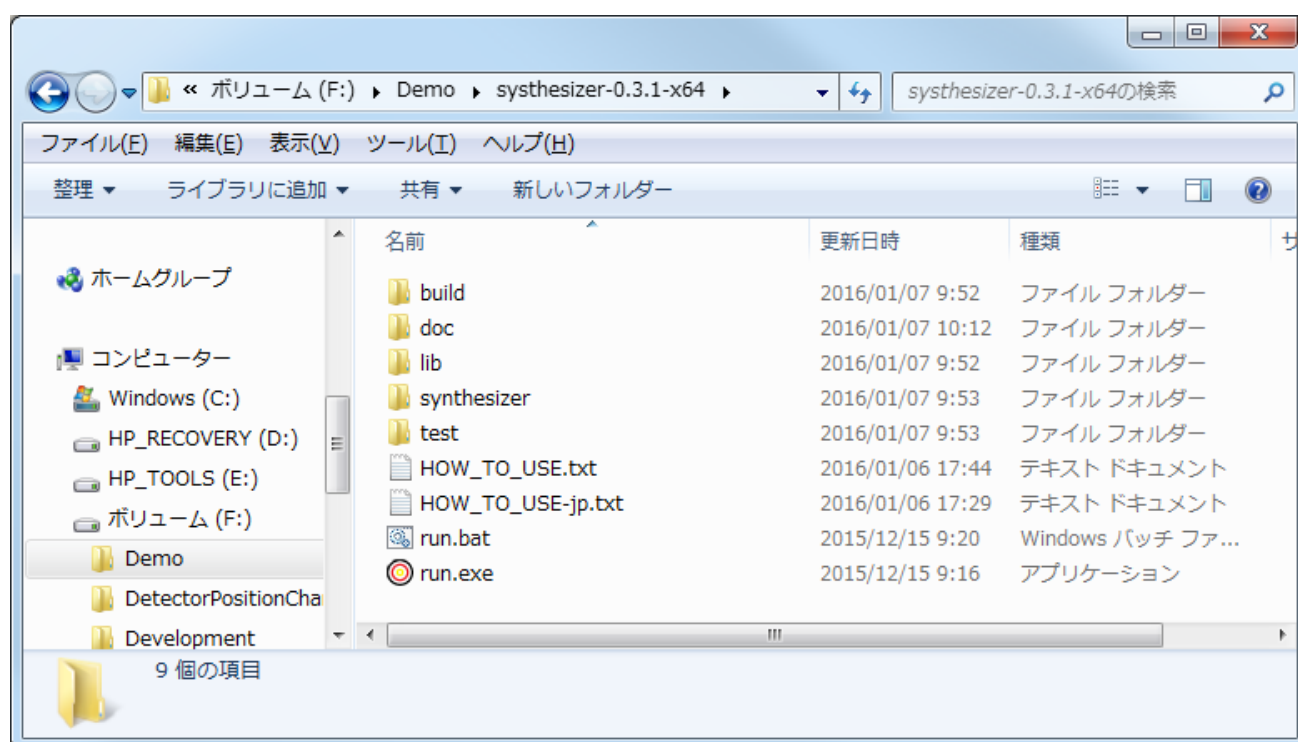
3 Basic Operations

3.1 Starting the Tool

a Run the tool by double clicking "run.exe" to get the initial main window as shown below.[1]
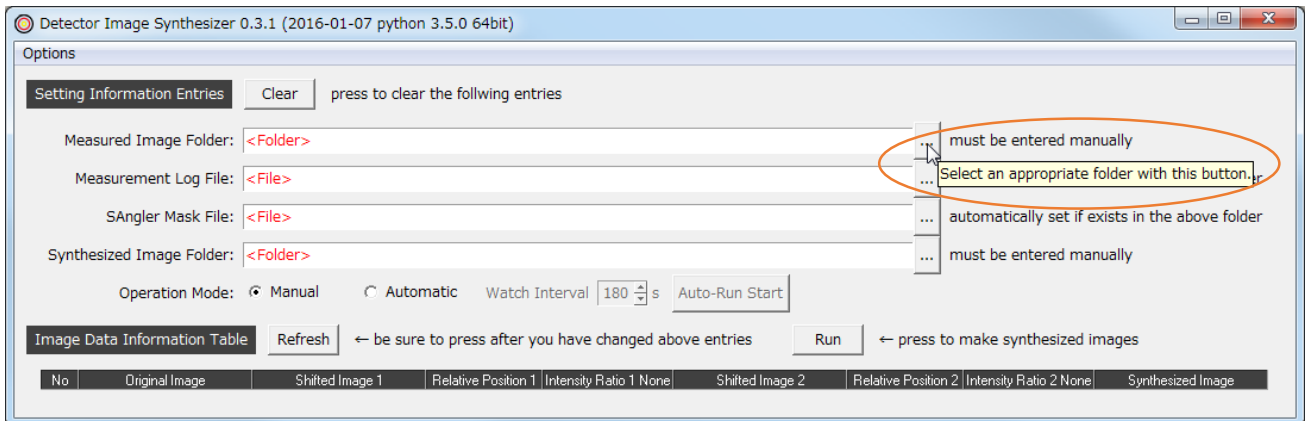
Fig. 3-1 Initial main window

3.2 Tool Tips

a Tool tips are available for main widgets and may help you as reference.

b To show the tool tips, place the mouse cursor over them keeping it fixed for a moment.

c Tool Tips appear in yellow bubble boxes as in Fig. 3-2.

**Fig. 3-2 Example of a tool tip of a folder selection button**

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[1] "run.exe" runs a "Windows application" version of the tool which doesn't accompany any "command prompt" window. On the other hand, "run.bat" runs a "console application" version which does accompany a "command prompt" window for trouble shooting purpose.

3.3　　Entering Setting Information

 a As you see in the "Setting Information Entries" section of the main window, four entry inputs are required.

 b You can enter the folders or files in any of the three ways, namely, by drag and dropping, or by pressing the selection button labeled as "…", or by typewriting directly into each entry box.

 c On filling in the "Measured Image Folder" in any way, a dialog window shown below will appear which asks for permission to set the subsequent two file entries automatically.

Fig. 3-3　Dialog to ask permission for automatic insertion
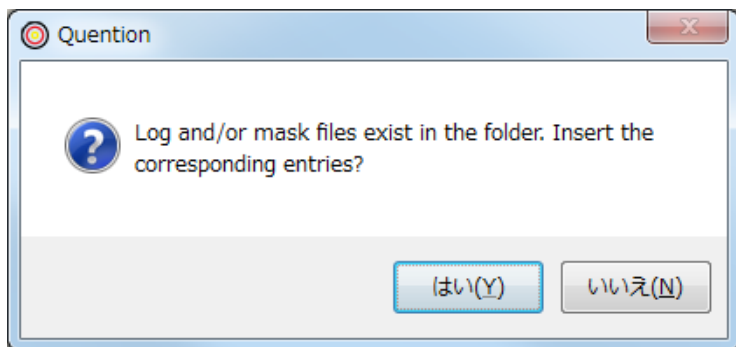
 d Reply "Y" if it is appropriate. If not, reply "N" to enter the files separately.

 e The window should look like the figure below after the setting of log/mask file entries.

Fig. 3-4　Main window after automatic setting of files
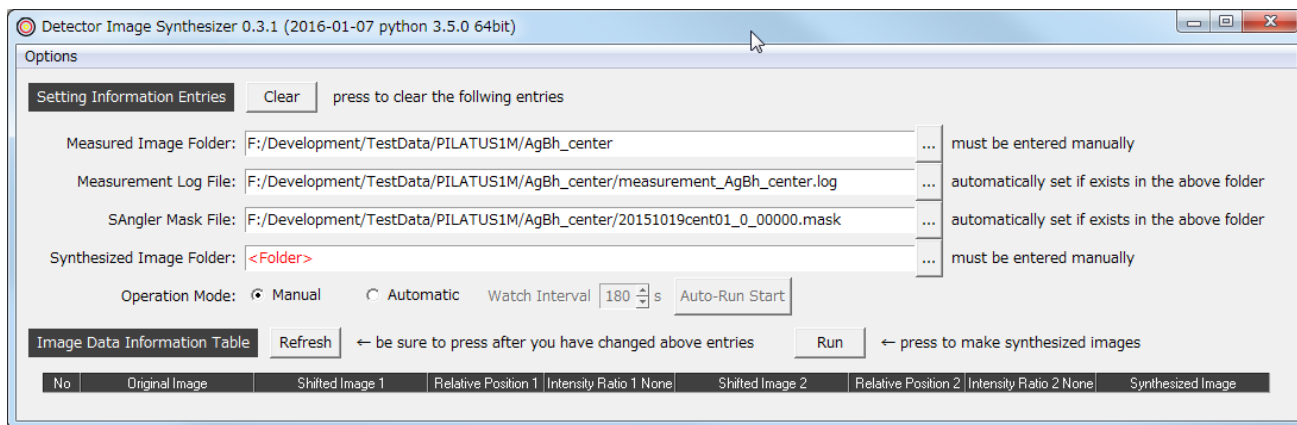
 f Enter "Synthesized Image Folder" as appropriate in the same way if one already exists.

 g In case you need to create a new folder, pressing the corresponding button labeled as "…" will help you by popping up a dialog[2] shown below, suggesting candidate locations of the folder.

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[2] This dialog pops up only when the entry box is empty.

Fig. 3-5   Dialog suggesting candidate locations of the "Synthesized Image Folder"
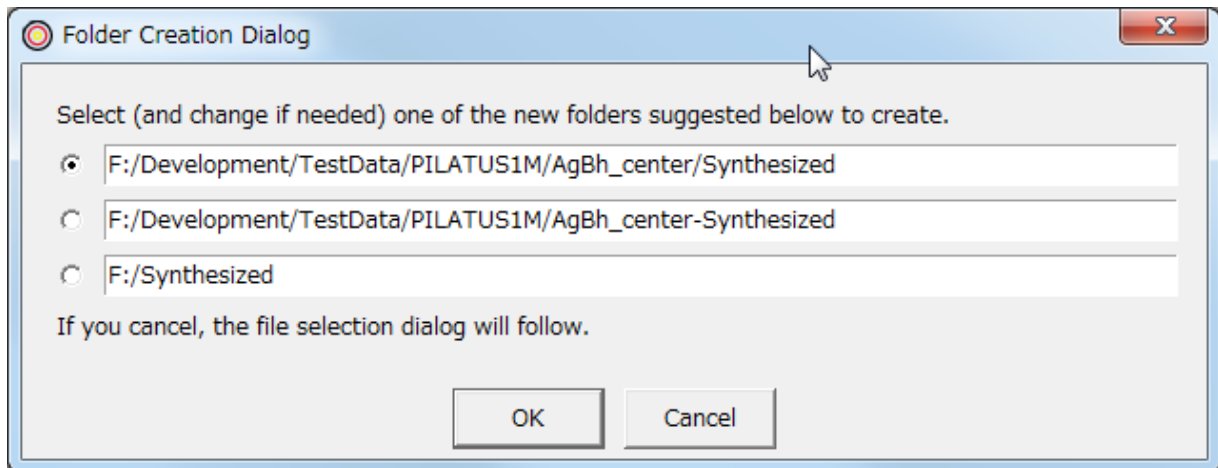

h   In case you want to cancel inputs, press the "Clear" button at top to clear all the four entries.

i   You can save the input values at the finishing of the tool. (See 3.6)

3.4   Manual Operation

a   When you are finished with the above entries, the "Refresh" button suggesting text will start blinking to make you aware that the tool is ready for the next step.

b   Press the "Refresh" button to get the current list of images available in the folder.

c   The main window should look like the figure below after refresh.

Fig. 3-6   Main window after refresh
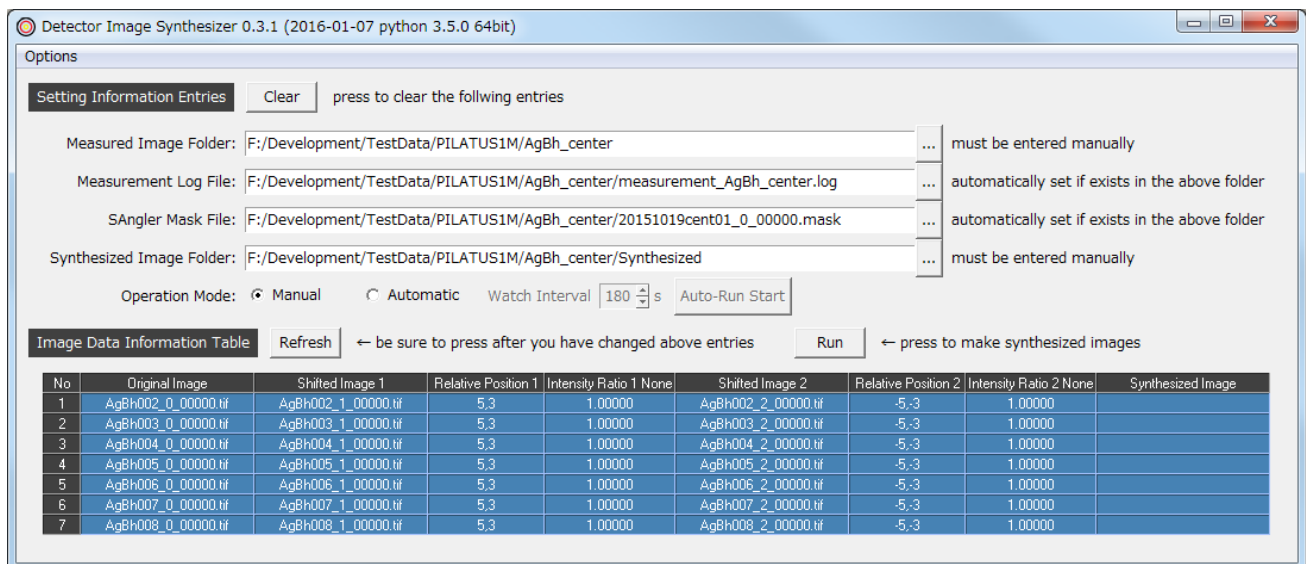
d   Blue rows in the list, all rows in this case, suggest "selected" rows to synthesize.[3]

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[3] The tool memorizes the last row processed in the run so that only yet-to-be-processed images are selected after each refresh. Accordingly, the first refresh in the run always selects all the rows.

e   Press the "Run" button and reply "OK" to the confirmation dialog to make synthesized images from selected raw images.

f   The progress will be shown in a log window which should look like the figure below.

**Fig. 3-7   Log window of the synthesizing process**
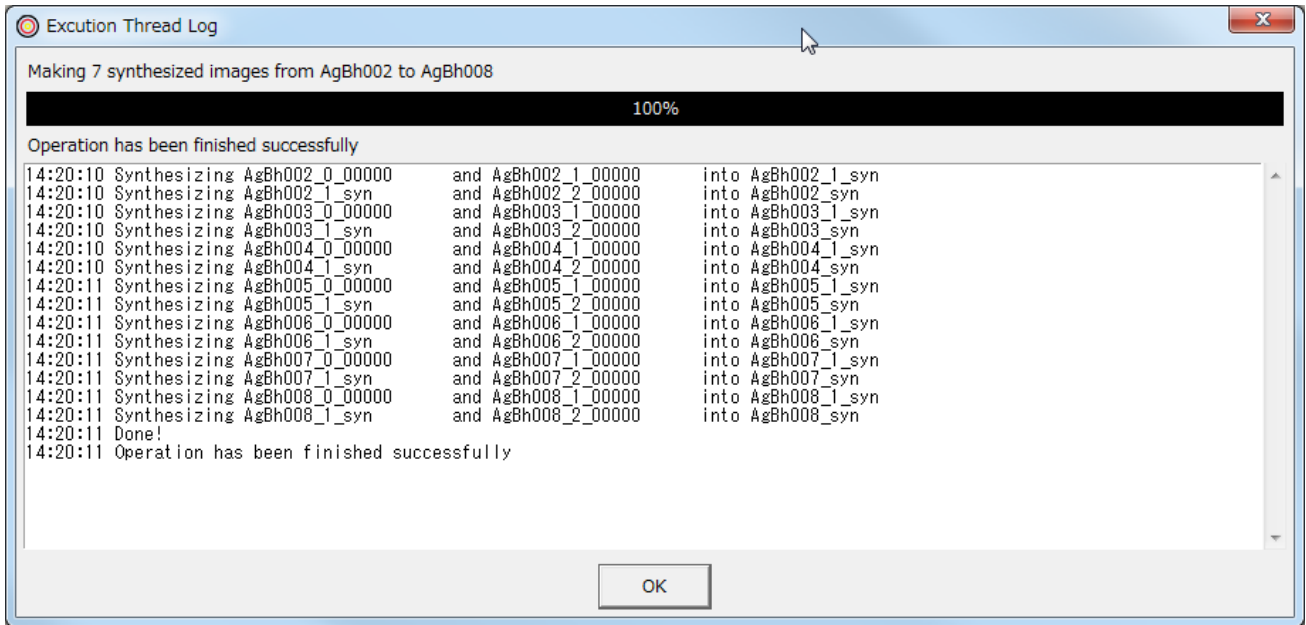
g   The log shows stepwise progress, reporting two steps for each sample with triple images.

h   Intermediate results such as "AbBh002_1_syn" reported in the log are kept only in memory and not saved into external files unless you specify in the "Developer Options". (See 5.4)

i   Press "OK" in the log window when finished.

j   Synthesized file names with "_syn" postfix are added to the rightmost column in the list.

Fig. 3-8   Main window after making synthesized images
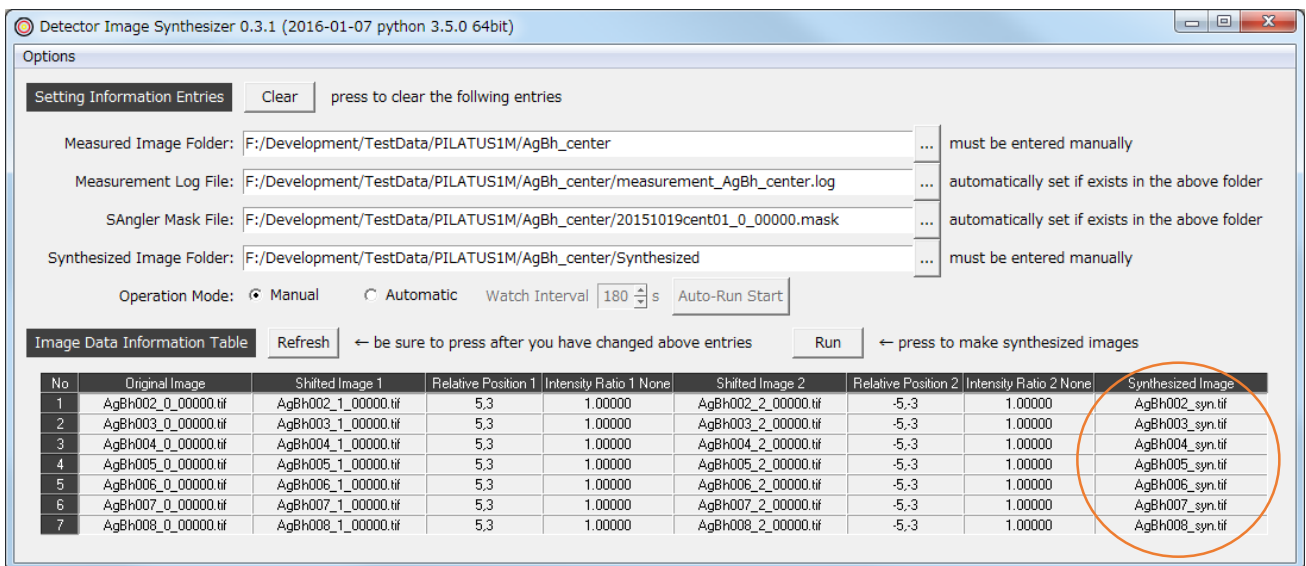
k   Note that the blue selection has disappeared now, since no more rows remain to be synthesized.

l   At this point, synthesized images have been already saved into the output folder.

m   The log messages same as in the log window are saved in a file named as "syhthesizerw.log" in the output folder.

Fig. 3-9   Results in a "Synthesized Image Folder"
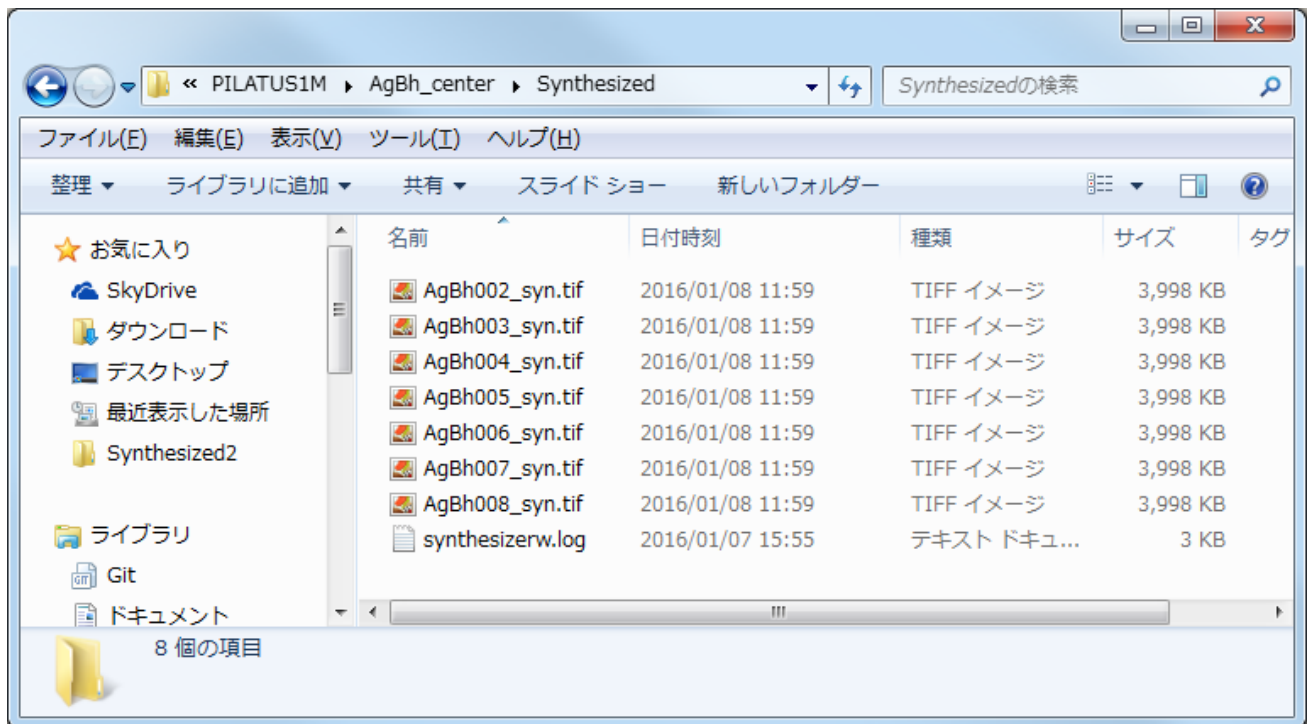

3.5   Automatic Operation

a   You can repeat automatically the "Refresh and Run" cycle in regular intervals.

b   The automatic control is considered to be useful when used in parallel along with the measurement operations.

c   You can switch to the "Automatic" mode by changing the "Operation Mode" radio button selection from "Manual" to "Automatic".

Fig. 3-10   Main window in the "Automatic" mode
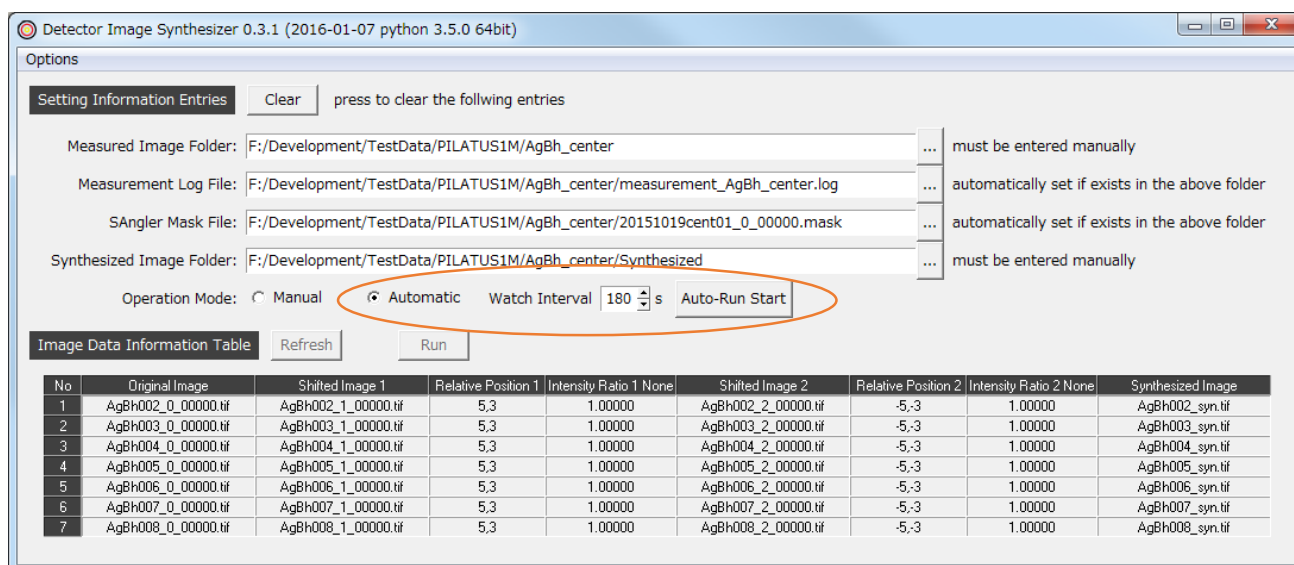
d   The default watch interval is set to 180 seconds. Change it with the spin button if it is not appropriate.

e   Press "Auto-Run Start" button to start the automatic control of the "Refresh and Run" cycles.

f   The log window in the automatic operation mode is shown in the figure below.

Fig. 3-11   Log window in the automatic operation mode
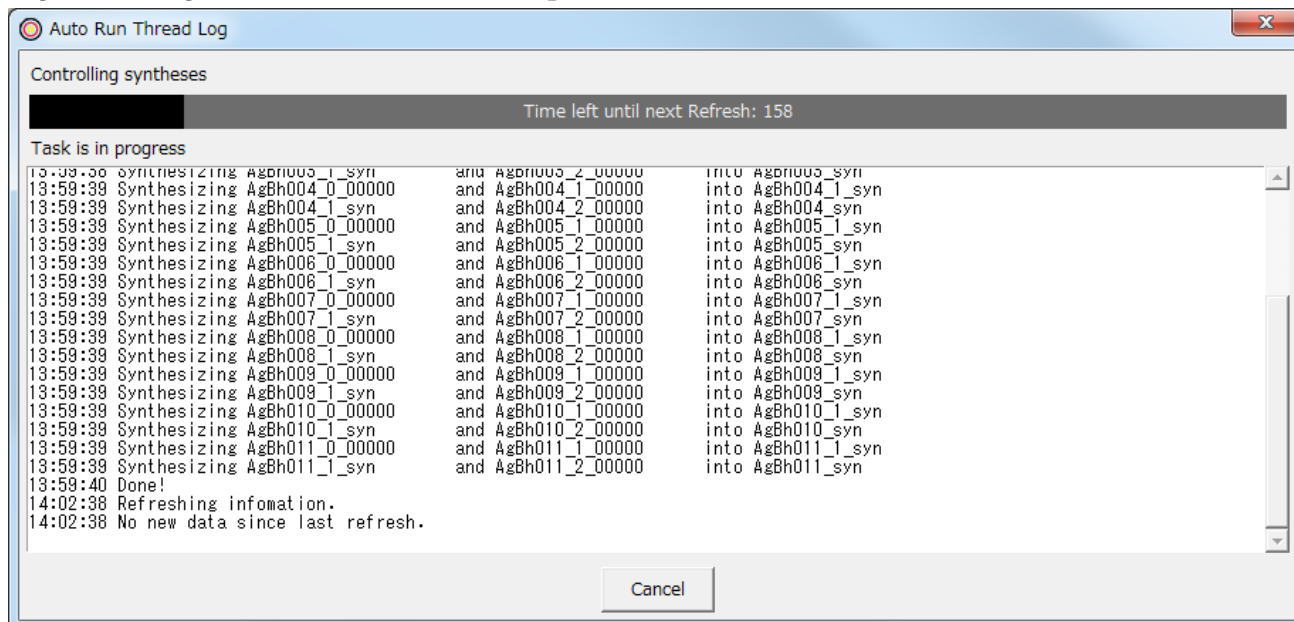
g   The progress bar shows the time left until the next refresh.

h   Press the "Cancel" button to stop the automatic control.

3.6　Finishing the Tool

  a You can finish the tool by clicking "X" button at the upper right corner of the main window.

  b Answer to the input information handling question dialog[4] if you have changed any of them.

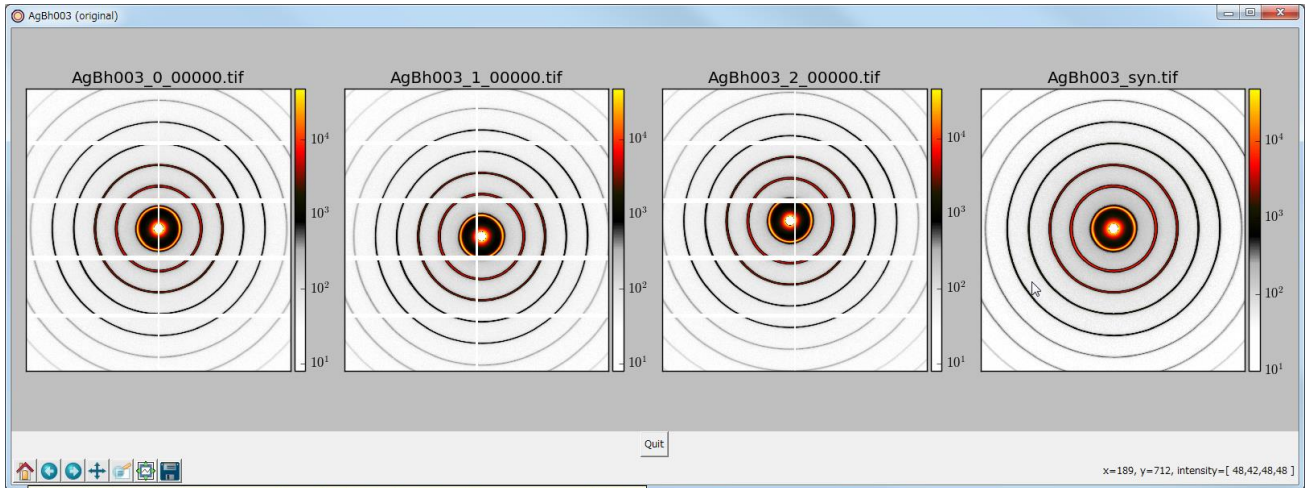**Fig. 3-12　Setting information handling question dialog**

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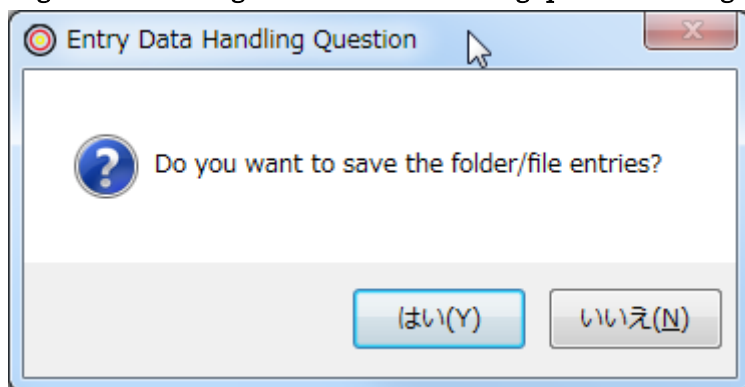
[4] This dialog appears only if the handling policy is set to "Ask". See 5.2.

4 Visual Checking of the Images

    a   You can double click a row in the "Image Data Information Table" to view the images visually as shown below.

Fig. 4-1　Images shown for visual checking

    b   For detailed inspection, following features are available.

- ・ Pixel coordinates and intensities corresponding to mouse cursor are shown at the lower right corner of the canvas.
- ・ Use mouse wheel to zoom in/out.
- ・ Drag mouse cursor to move the images.
- ・ Clicking with <shift> key down shows pixel annotations (see Fig. 4-2); press <escape> key to hide them. You can move the annotations, pixel by pixel, using arrow keys.
- ・ Mouse wheel with <ctrl> key down changes color map function gradually.

    c   Retry the synthesizing operation if you find any flaws. See "Advanced Operations" sections for retry operations.

**Fig. 4-2　Pixel annotations shown for detailed inspection**
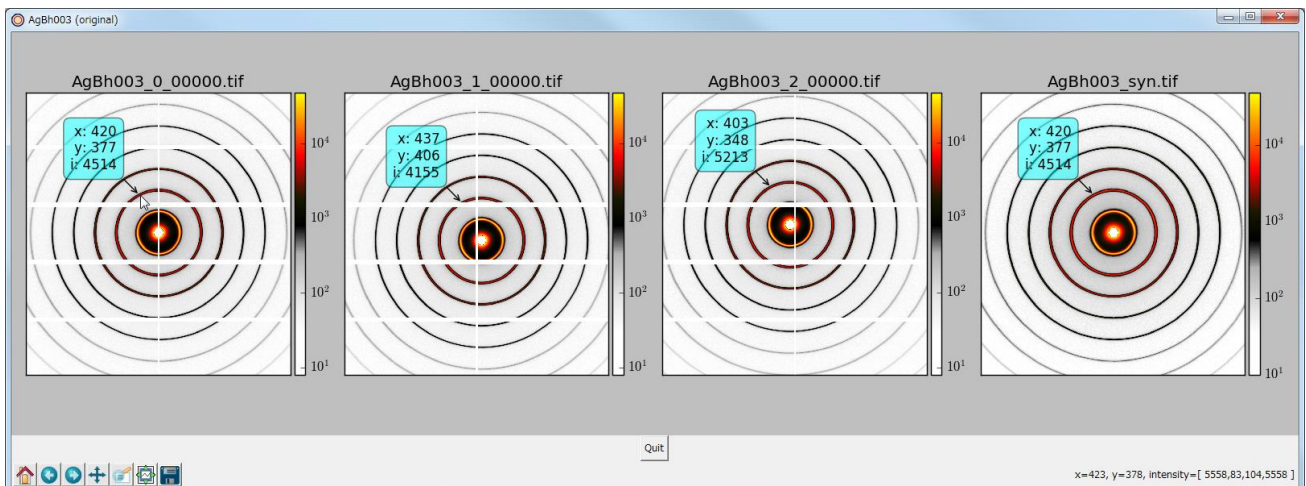
5 Advanced or Less Frequently Used Operations

5.1 Partial Operation

a In the manual operation mode, you can select an arbitrary subset of the rows in the "Image Data Information Table" and (re)do synthesizing.

b Such partial selection can be attained by one of the following ways:

- clicking a single row
- dragging over or <shift>-clicking consecutive multiple rows
- <ctrl>-clicking non-consecutive rows
- clicking the [No] title at the upper left corner of the table which selects all rows

Fig. 5-1 Selection of a subset of rows and the popup action menu
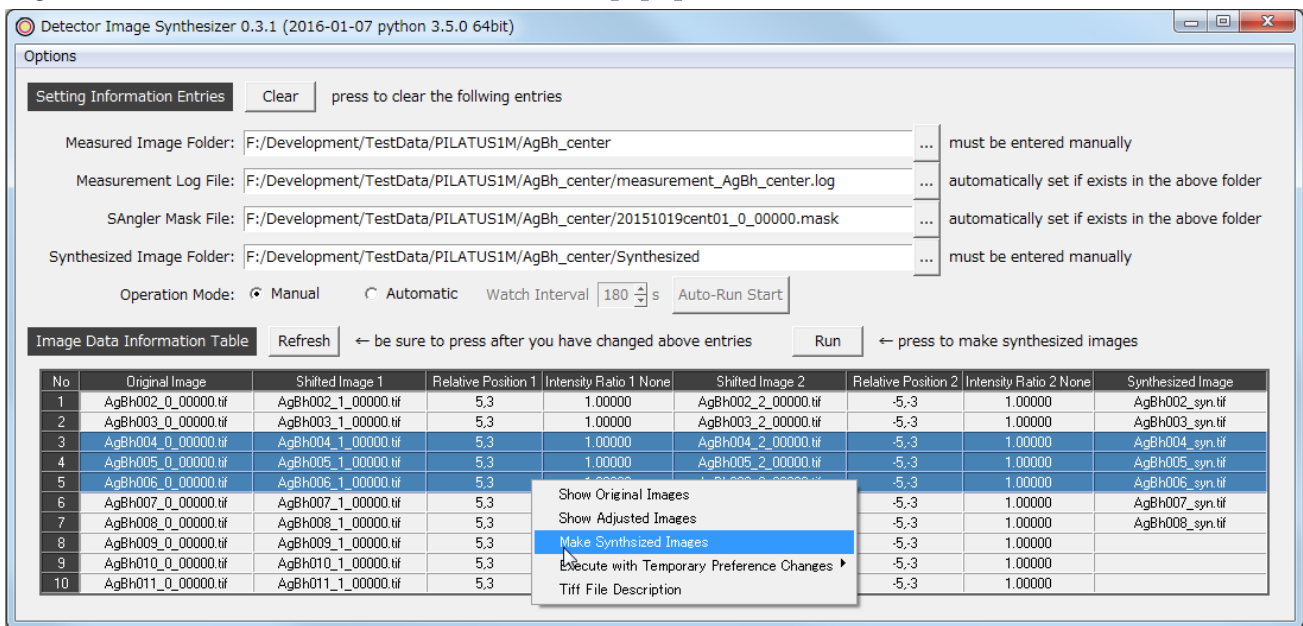
c For the selected subset, you can select an action from the action menu invoked by right-clicking the mouse button.

d Available actions are listed in Tab. 5-1 below.

Tab. 5-1 Available actions in the action menu

Action Name	Description
Show Original Images	Shows detector output raw images and a synthesized image.
Show Adjusted Images	Same as above except showing adjusted images for shifted ones.
Make Synthesized Images	Makes synthesized images. Same action as pressing the "Run" button.
Execute with Temporary Preference Changes	See 5.3.
Tiff File Description	Shows the description text attached to the tiff file.

5.2 Preference Changes

a   Users can change some of the modes in which the tool operates in the dialog shown below, which is invoked by clicking [Options] / [Preferences] in the menu.

b   Changes in this dialog are valid until the next changes by this dialog.

Fig. 5-2   Usual Preferences Dialog
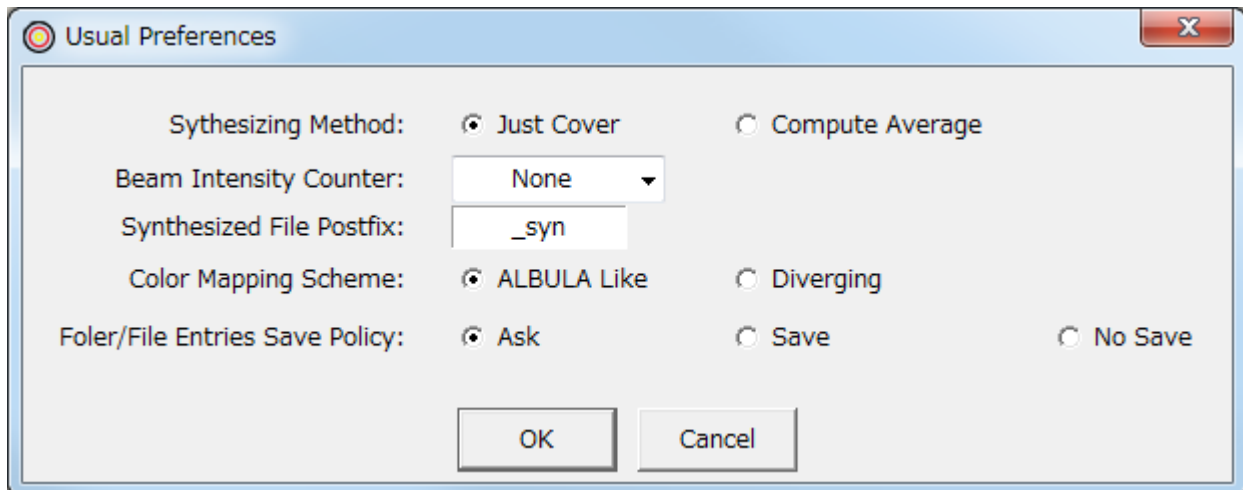
c   For "Synthesizing Method", select one from the following table.

**Tab. 5-2   Available Synthesizing Methods**

Method Name	Description
Just Cover	replaces missing pixel values of the base image by corresponding valid pixel values of the shifted image (default)
Compute Average	compute averages of the corresponding valid pixel values of the measured images

d   "Beam Intensity Counter" can be used to normalize the values, in cases when the beam intensity variation among the measurements seems significant, using one of the valid intensity counters shown in this combo box. Selecting "None" here, which is default, means applying no normalization.

e   The value you put in the "Synthesized File Postfix" is appended to the output file names as specified.

f   "Color Mapping Scheme" can be selected among the two. Try and see the difference.

g   If "Ask" is selected, the tool pops up the question dialog at the closing of the tool (See 3.6). Otherwise, select "Save" or "No Save" if the preference is constant.

5.3   Temporary Preference Changes

a   The dialog shown below appears when you select one of the "Execute with Temporary Preference Changes" actions in the cascaded submenu.

b   Changes in this dialog are valid only during this execution on the selected rows.

Fig. 5-3   Temporary Preferences Dialog
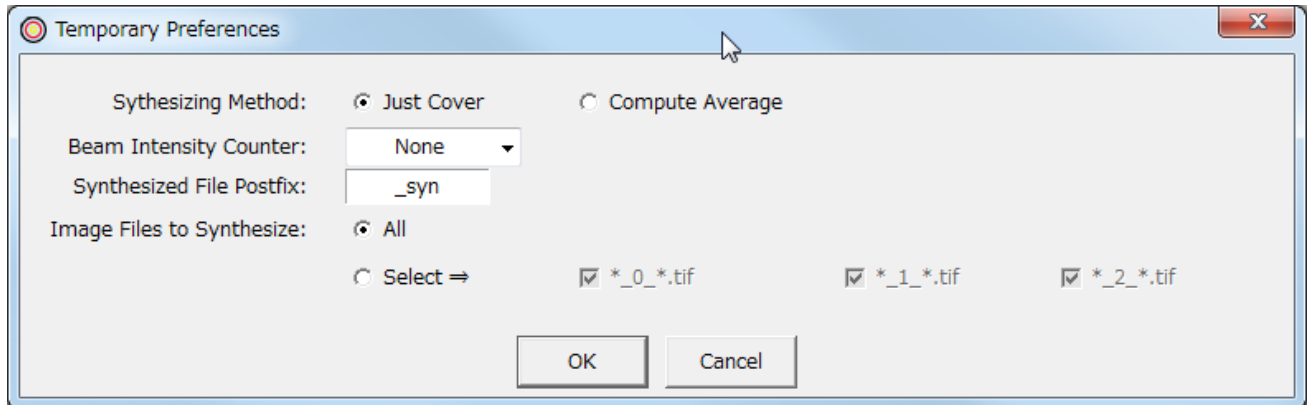
c   Select "Image Files to Synthesize" by the check buttons if you do not want to use all the shifted images.

d   See the previous section for the description of other items.

5.4   Developer Options

a   Users are not supposed to change "Developer Options".

b   The dialog shown below is invoked by clicking [Options] / [Developer Options] in the menu.

Fig. 5-4   Developer Options Dialog