Biochip (LOC) Interface Unit RYURO: SRB00X Series

Background of RYURO development

There are many cases being wasted the important time for the researchers on the studies to use Biochip. The wasted time is quite different from the purpose of studies. For instance, it is very much time consuming for unexpected subject or troublesome like connecting and fixing between micro fluidics on Biochip and outer tube interface without any liquid leakage or without crush for microfluidics tube and canals, or to get firm connection for Biochip and external circuit.

It will bring you best advantage as a research assistant to keep important time for study by RYURO.

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1. Summary of Biochip Interface Unit: RYURO.

RYURO is the Interface Unit to connect between Inlet/Outlet of microfluidics on Biochip and outer fluidics source/release, or electrode on Biochip and external electric circuit by floating structured one touch operation. In short, it gives easy solution for a troublesome interface of Biochip.

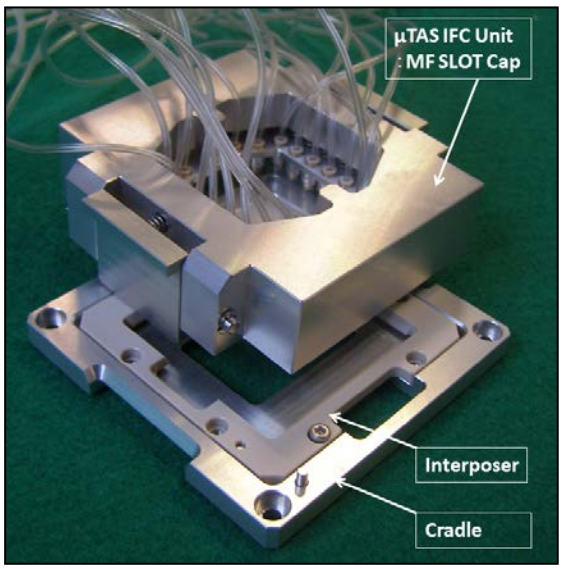

Fig. 1 RYURO : SRB001

RYURO has composed with two of basic functional component, (1) Cradle, (2) Micro TAS Interface(μ TAS IFC) Unit

(1) Cradle is a base socket to load Biochip. Biochip is able to design flexibly for chip size like 46 mm x or 25 x. optionally, or like a combination of microfluidics canal 16 to zero, and also up to 16 of electrode/terminal on chip.

(2) Micro TAS Interface(μ TAS IFC) Unit has a function to fix the biochip to Cradle by MF SLOT (Micro Fluidics Spring Load One Touch) Cap which has superior feature to seal Inlet/Outlet of micro canal and outer fluidics perfect and connect outer circuit to electrode on chip by spring load one touch operation. Also, MF SLOT Cap has a window to use for observation visually by microscope or laser. A window size is available as 30 x 20, 25 x 15 or 10 x 10 mm which will be useful for microscope and laser right pass.

1-1. Products Features

- Micro Fluidics Inlet/Outlet : 0 ～ 32 In + Out
- Electrode : 0～16 (DC～5GHz performance)
- Double Floating Structure for perfect seal/connect
- Wash out, maintain and repairable
- Multiple leak protection structure
- One Touch Operation for easy remove Biochip
- Operating Temp. range : 0℃～+50℃

1-2. Applications

- Biochemical Lab and application field.
- Biochip Study, Evaluation
- Interface Unit to Micro Fluidics and Outer fluidics
- Interface unit for Biochip inter circuit and External
- Micro Fluidics System IFC
- DNA/Protein Chip interface unit

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2. Basic organization of RYURO

RYURO has been structured two of basic component (1) Cradle and (2) μ TAS IFC Unit. (1)Cradle is a function to load the Biochip, and (2) μ TAS IFC Unit is a function to connect microfluidics and electric circuit.

2-1. Cradle

Cradle composed with Cradle base and interposer. The interposer will be designed to fit with Biochip size of any user design size. Outer dimension of Cradle is 70 x 70mm (Standard size) and be able to hold on board or chassis by 4 of screws on 4 corners. Biochip might be held by Interposer for a size of 46.0 mm to 25.0. Then Interposer has a function of alignment for Inlet/Outlet of micro fluidics canal on Biochip. Also there is a window for optical observation on a center of cradle. .

Regarding to design of Inlet/Outlet location, micro canal, electrical circuit and electrode on Biochip, please refer item 4.

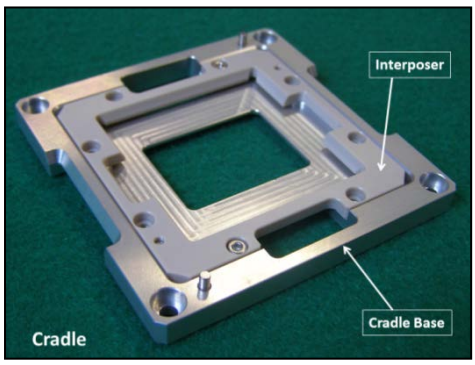

Fig. 2 Cradle

2-2. Micro TAS Interface (μ TAS IFC) Unit

μ TAS IFC Unit was designed as a structure of MF SLOT (Micro Fluidics Spring Load One Touch) cap which has a function to hold Biochip on cradle by one touch operation. μ TAS IFC Unit adjust the position of Inlet/Outlet to MF probe position by alignment key, and connect between micro canal on Biochip and external fluidics without any leak problem by Double Spring Load feature.

Also electrode on Biochip will be connected with low contact resistance under 40m ohms by using spring probe mount on μ TAS IFC Unit. (Fig, 3 is no electrode type)

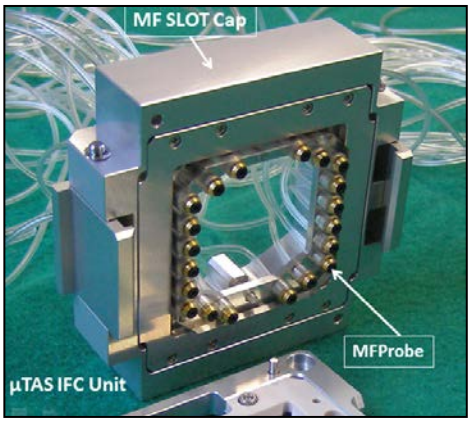

Fig. 3 μ TAS IFC Unit

3. Interface Method of Biochip

Basic design structure of RYURO with biochip is in Fig. 4. Cradle will be fixed on a board or chassis by 4 of screws on the corners. Then Biochip will be loaded and fixed to the cradle adjusted location by interposer. All interface between external fluidics and Inlet/Outlet of Biochip's micro canals, and electrode on chip and external electric circuits will be connected stick and firmly by loading μ TAS IFC Unit (MF SLOT Cap) to cradle.

It is simple operation.

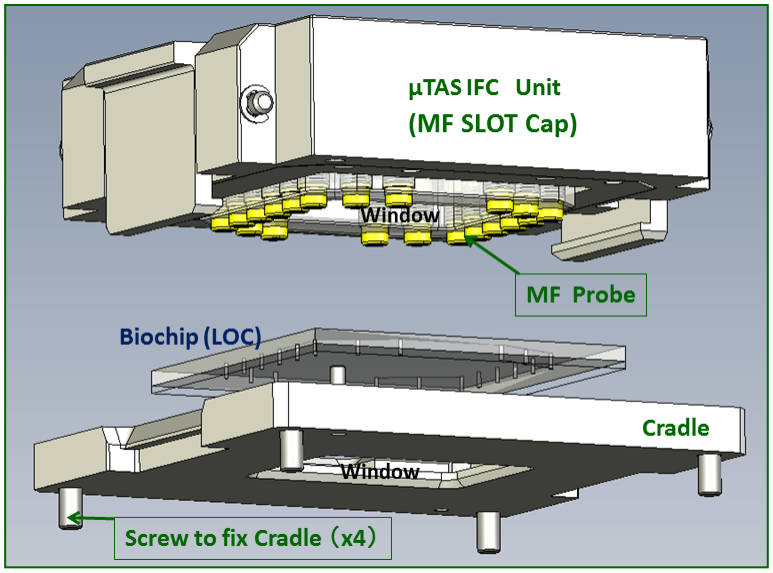

Fig. 4 RYURO and Biochip interface

4. Design structure for Inlet /Outlet of microfluidics on Biochip

Easy way to use or load Biochip with RYURO is to take a matrix concept of Inlet/Outlet and electrode location to be same coordinates as basic matrix of Fig.5 (Fig.8), Fig.9 and Fig.10 on design of the Biochip.

It is an example of a Biochip in Fig. 5 which has 10 Inlet, 10 Outlet and 4 of electrode on chip. Micro fluidic canals are free to design on chip. Biochip dimension is 46.0 x 46.0mm and 3.0mm thickness here. The marks on Fig. are

○、● : Inlet/Outlet (20)　● : Electrode (4)

The window size on this chip is 20 x 30mm. The matrix of Inlet/Outlet is symmetrical for right and left, also up and down, there are 6 of (●) with 5.0mm pitch toward vertical position as the locations of right (left) at 17.5mm from centerline, and also 4 of (○) each on the location of 12.5 / 7.5mm and 15.0 /17.5mm, so total 10 Inlet/Outlet on right and left each. Electrodes locate 17.5mm up and down far from center line, and 2 of (●) with the pitch of 5.0mm total 4.

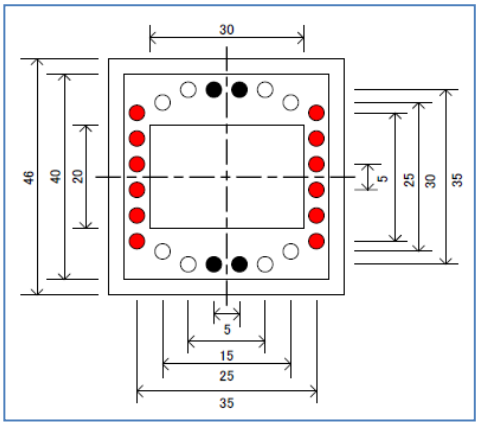

Fig. 5 Basic coordinates of biochip

This is basic design concept of Biochip to make for any arrangement. The other one of Biochip design example is Fig. 6 which is 40 x 30mm chip size (□), Inlet = 4(●), Outlet = 4(●) concept design base referred with Fig. 5. Interposer size and direction of RYURO is adjusted to the size of Biochip with no problem. The size of window is 20 x 30mm here so no changed with original. Inlet and Outlet are located on 35mm far together on right and left 4 x 2=8(●). Fig.7 is an example to have 4 of electrode(●) with 8 Inlet/Outlet(●).

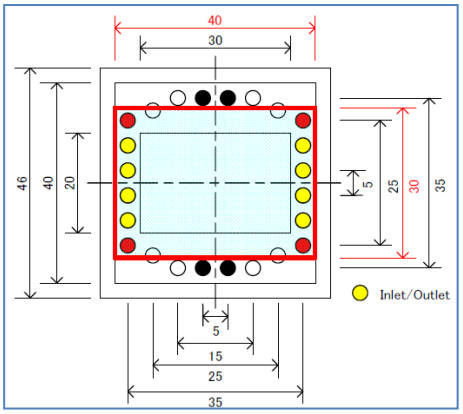

Fig. 6　4 Inlet/4 Outlet (●) Lined structure

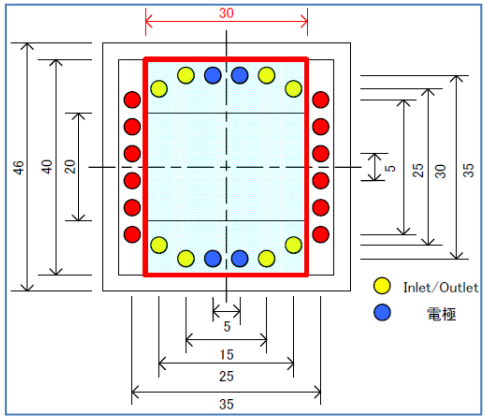

Fig. 7 4 Inlet/4 Outlet (●), 4 Electrode (●)

It is a recommendation of procedure to take same coordinate position of Inlet/Outlet, electrode first and then decide the dimension of Biochip. Basic Inlet/Outlet and electrode coordinate on biochip are shown on Fig.8 (Fig.5), Fig. 9 and Fig. 10.

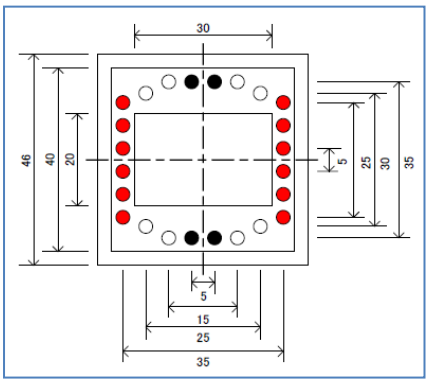

Fig. 8　SRB001 type(1)

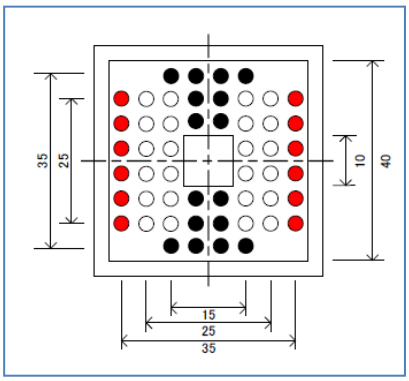

Fig. 9　SRB002 type(2)

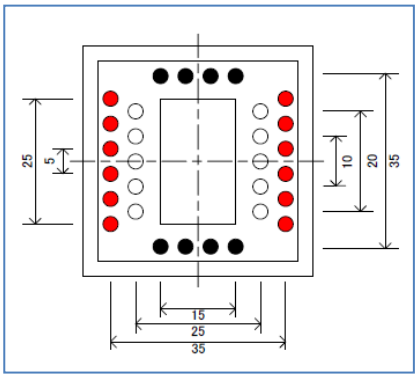

Fig. 10　SRB003 type(3)

5. System structure example with RYURO/Biochip and Microfluidics.

Fig. 11 is an example and a structure for Microfluidics system with RYURO. The output number of microfluidics from pressure controller connected and sourced from pressure source will be prepared same number with Inlet on Biochip. On this example structured Fig.11 is 4. It is programmable & controllable pressure forces, wave form and cycle for channel each individually. The outputs of pressure controller connect to Liquid Tanks for sourcing out liquid from Tanks to Multiplexer (or Biochip). Multiplexer has the output function of switching, mixing and joining of input channels controlled by PC programming, and connect to MF probe of RYURO to interface to Inlet of Biochip. MF probes of RYURO stick to Inlet of Biochip and also MF probes on the other side stick to Outlet. It make microfluidics path securely via micro canal in the Biochip. Liquid will pass through all the channels. Because RYURO has individual suspension interface function, RYURO is able to reach high reliable stick interface and connection for any connecting difficulty like ramp or unevenness connection. Also, due to MF SLOT Cap feature, it is very easy and quick to change or switch Biochip in RYURO.

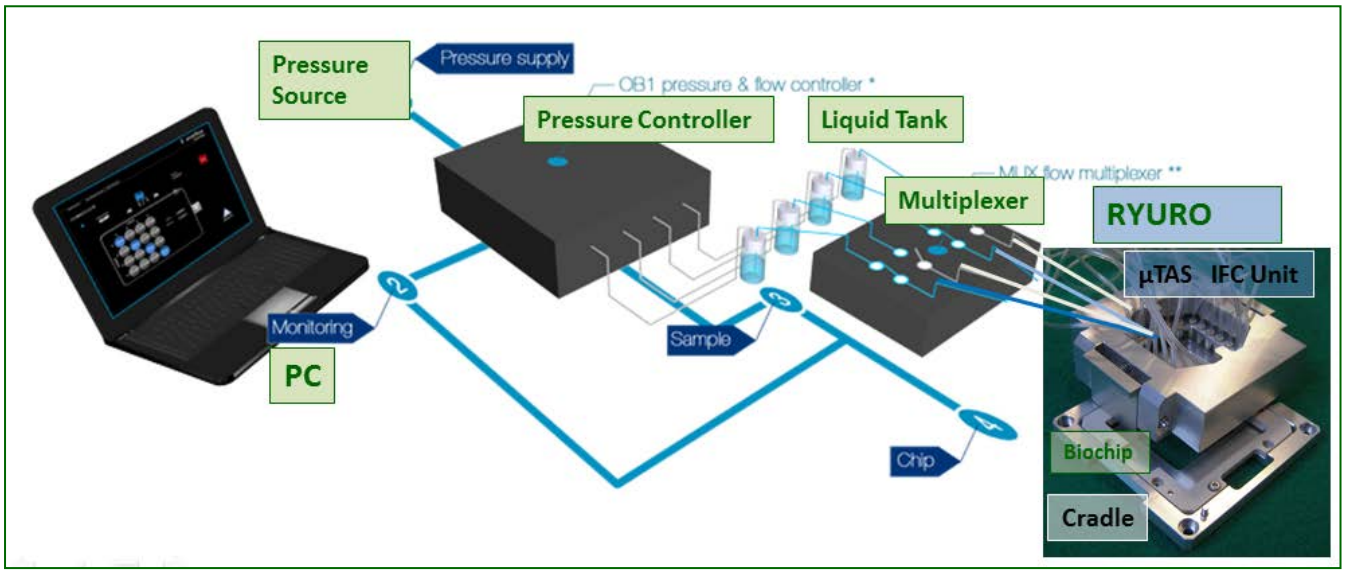

Fig. 11 Example of Microfluidics System Structure with RYURO

6. RYURO Numbering and ordering method

SRB001-10/10-4-46.0x46.0x3.0-SS

- Consult Factory (Special assign by SER)
- Chip Length x Width x Height size: Example 46.0 x 46.0 x 3.0mm
- Electrode Number: Example 4
- Number of Inlet/ number of Outlet: Example 10 and 10
- RYURO type number: Ref. Fig.8~Fig.10
  - SRB001 : type (1) : Biochip Inlet/Outlet matrix (1) (Photo Example)
  - SRB002 : type (2) : Biochip Inlet/Outlet matrix (2)
  - SRB003 : type (3) : Biochip Inlet/Outlet matrix (3)

**Please contact to below if you have any question.

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