

## New type of hydrogen purifying filter

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Hydrogen production system working on vehicle is under development. This system will be expected to produce  $H_2$  gas about 1-2 L/min. This amount is expected required for  $H_2$  fuel cell working on vehicle for producing electricity in order to drive vehicles. In this process, the key problem is the filtering system. In the present hydrogen production, original fuels are mainly hydrocarbons, such as natural gases. These gases are decomposed with chemical processes in the plant. In this process, they have to use filters for separating pure  $H_2$  from mixed gases. The popular filter system, however, mainly based on the diffusion through the thin chemical films, and separation speed is less than 0.01 L/min. and it is not useful.

We are developing two kinds of new filter, which are introduced herewith:

1. Using liquid propane for separation such as shown in Fig.1. The mixed gases go through the liquid propane gas area and propane gas from the mixed gases will be liquefied to be separated from  $H_2$ . Fine structure of the liquid filter uses thermos bottle. The cooled mesh in the filter must be installed, because of the vaporized propane will exist all the times even near the liquid propane surface and this vapor must be liquefied not going out from filter area.

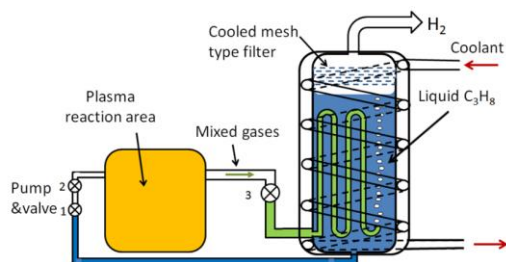


Fig. 1. Liquid type filter.

The pipe connected to the gas decomposition area from where the mixed gas will be produced, will be very narrow about 0.5~1.0 mm in diameter and the location of the exit in the liquid propane area must be close to the bottom of the bottle. It is better that this pipe will be bent a couple of turns for obtaining the better cooling effect of the mixed gases.

2. Another new filter can produce pure hydrogen. A key structure is shown in Fig.2. This idea is even similar to our old idea (Ref.2). The present system will be driven by electric motor to drive the circulating inner fins. Therefore, this is stably working and enough amount of hydrogen will be produced easily. In order to control the inside fin, we have two types:

- (1) A driving motor will be set up inside the fin area.

- (2) A driving motor is set up

separately in the outside area and connected to the inside fin through magnetic field. (Fig.2).

Here, the number of screw type fin will be 3-4 pieces. The rotation speed of the fin will be around 20,000 rpm.

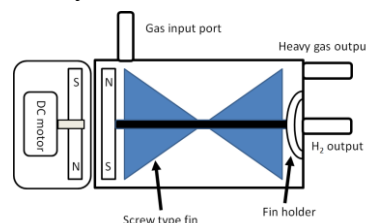


Fig. 2. Rotation type filter.

## References

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