

Optimised Feedstock Flow in Membrane Stacks

Fields of Use / Market

The use of membranes for separation or chemical reactions has proven reliable over recent decades in process, environmental and pharmaceutical applications. The potential fields of use of membrane processes have increased substantially. According to market analysts (Freedonia Group) the requirement for membrane materials alone in 2006 will reach approximately US\$ 2.6 billion.

In process equipment that uses flat membranes of different compositions in stacks, such as is the case in fuel cells, an efficient flow manifolding is essential to ensure that the total membrane surface is used effectively.

Current State of the Technology

The feed of conventional stacks with the input fluids is achieved by means of an internal system of channels which passes through the whole stack. The heating or cooling flow channels are often integrated in the stack in an analogous manner.

These arrangements lead to a reduced use of the available membrane surface (in the case of fuel cells, the surface of the membrane electrode assembly) as well as a substantial loss in pressure across the stack.

Innovation

The present invention overcomes this disadvantage by separating the main feed channels (and placing them on the outside of the stack) from the substantially smaller internal channels which run parallel to the main channels and are linked to them at regular intervals. This makes it possible to distribute the feedstock more easily and evenly across the various cells or cell modules without wasting expensive membrane material.

In addition, the cooling or heating of the stacks is greatly facilitated.

Benefits

- Up to 40% increase in the usable membrane surface
- Minimal loss in pressure within the stack
- Flexible fluid flow allowing controlled access to single modules
- Cost-savings through reduced waste of membrane material

Patent-Portfolio

German and US patent applications have been lodged.

Example of a possible implementation

The drawing below illustrates one possible way of implementing the novel design. In particular, it illustrates the separate flow of feedstock through the external and internal channels. In this example, the transfer from the main to the internal channels occurs at the level of the cooling or heating plates, whereby the feedstock is directed to individual stack elements. This leads to an optimal provision of the active membrane surface.

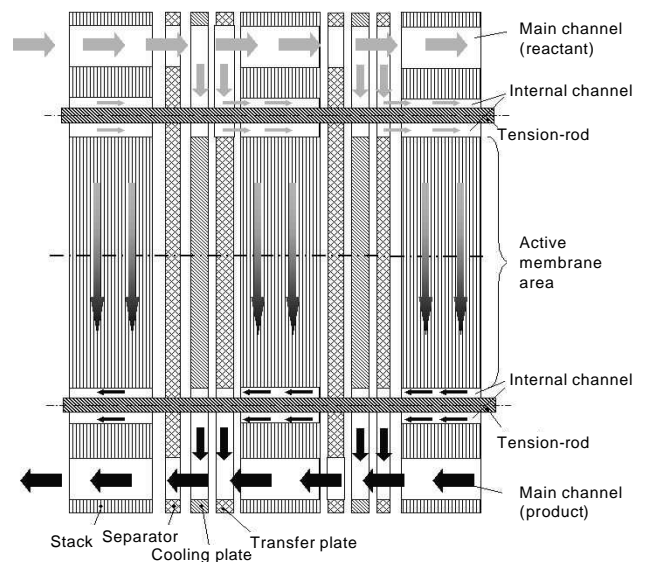


Figure: Longitudinal profile of a membrane stack designed in accordance with the present invention.

Licensing Opportunities

TLB GmbH is pleased to be able to offer commercial rights to this exciting innovation to companies with the potential to exploit this technology.

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