

together so that the at least one surface closes the first groove to form a first channel in said flowpath and closes the plurality of second grooves to form a corresponding plurality of second channels in the flow path, the first channel having a cross-sectional area and each second channel having a respective cross-sectional area which is smaller than the cross-sectional area of the first channel, the plurality of second channels being arranged in the flowpath for liquid flow in parallel therethrough and in series with the first channel, the cross-sectional areas of the second channels being such that the second channels collectively resist hydrostatically driven liquid flow along the flowpath and wherein each second channel has a respective cross-sectional area of between $500\mu\text{m}^2$ and $1000\mu\text{m}^2$.

The following is a more detailed description of embodiments of the invention, by way of example, reference being made to the appended schematic drawings in which:

Figure 1 is a cross-sectional representation of parts of components of a chip-type micro-reactor during a stage in the production of the micro-reactor; and

Figure 2 shows in plan view the final configuration of channels and of reservoirs in the micro-reactor produced from the components shown in Figure 1.

As seen in Figure 1, the chip-type micro-reactor is formed from a lower glass block 10, a middle glass block 11 and an upper glass block 12. The lower glass block 10 has an upper planar surface 13. The middle glass block 11 has a lower planar surface 14 and an upper planar surface 15, and the upper glass block 12 has a lower planar surface 16.

Each large channel 17',22',25',27',31' and 33' may have a cross-sectional area from about $3,000 \mu\text{m}^2$ to about $10,000 \mu\text{m}^2$, for example about $3,000 - 4,000 \mu\text{m}^2$. Each small channel 40a',40b',40c' ~~may have has~~ a cross-sectional area from ~~about~~ $500\mu\text{m}^2$ to ~~about~~ $1,000 \mu\text{m}^2$, for example $500 \mu\text{m}^2$. As the upper surface 13 of the lower glass block 10 and the lower surface 14 of the middle glass block 11 are planar, these cross-sectional areas are generally the same as those of the grooves from which the channels were formed.

The first rectangular grid 37 lies generally over the gap between the second end 21 of the first large channel 17' and the first end 23 of the second large channel 22'. Specifically, the first connecting channel 41a' lies over the first large channel 17' adjacent its second end 21 and the second connecting channel 42a' lies over the second large channel 22' adjacent its first end 23. Hence, the first connecting channel 41a' is in fluid communication with the first large channel 17' and the second connecting channel 42a' is in fluid communication with the second channel 22'. The five small channels 40a' extend generally over the gap between the first and second large channels 17',22'. Hence, the first large channel 17' is connected to the second large channel 22' by the connecting channels 41a',42a' and the small channels 40a' formed by the first rectangular grid 37.

In a similar manner, the second rectangular grid 38 connects the third large channel 25' and the fourth large channel 27', the first connecting channel 41b' of the second

It will be appreciated that the micro-reactor may be varied in many ways within the scope of the attached claims. Firstly, the micro-reactor may have any desired configuration of channels and reservoirs, depending on the proposed use.

Secondly, the gaps between the channels in the lower glass block 10 could be bridged ~~by a single small channel, or~~ by a plural number of small channels other than five.

In the micro-reactor described above, the use of the connecting channels 41',42' means that the alignment between the lower and middle glass blocks 11 is not so critical. As the connecting channels 41,42' extend generally normal to the large channels with which they interconnect, slight deviations in alignment do not affect connection of the connecting channels 41', 42' with the large channels.

While in the micro-reactor described above, the small grooves 40 are provided in a different glass block to the large grooves 17,22,25,27,31,33, this need not be the case. A mixture of small and large grooves could be etched in the same glass block and closed by a single planar surface of another glass block.

In many cases, it may be desirable to bridge two large channels by a plurality of small channels arranged such that liquid flow passes in parallel through the small channels. In this case, the narrow channels may or may not be geometrically parallel to one another.

CLAIMS

1. A device having a flowpath therein for electrokinetically driven liquid flow therealong, the device comprising at least first and second members together having a first groove with a cross-sectional area and a plurality of second grooves, each one of the second grooves having a respective cross-sectional area which is smaller than the cross-sectional area of the first groove, the members together having at least one surface and the members being connected together so that the at least one surface closes the first groove to form a first channel in said flowpath and closes the plurality of second grooves to form a corresponding plurality of second channels in the flow path, the first channel having a cross-sectional area and each second channel having a respective cross-sectional area which is smaller than the cross-sectional area of the first channel, the plurality of second channels being arranged in the flowpath for liquid flow in parallel therethrough and in series with the first channel, the cross-sectional areas of the second channels being such that the second channels collectively resist hydrostatically driven liquid flow along the flowpath **and wherein each second channel has a respective cross-sectional area of between $500\mu\text{m}^2$ and $1000\mu\text{m}^2$.**

2. A device according to claim 1, wherein the first groove is provided in the first member and the second grooves are provided in the second member, the at least one surface comprising a first surface on the second member that closes the first groove and a second surface on the first member that closes the second grooves.

The aperture being in fluid communication with the flowpath.

8. A device according to claim 7, wherein a third member is connected to said one of the members with the aperture, the third member having an aperture that connects with the aperture in said one of the members.

~~9. A device according to any preceding claim, wherein each second channel has a respective cross-sectional area of between $500\ \mu\text{m}^2$ and $1000\ \mu\text{m}^2$.~~

~~9. 10.~~ A device according to any preceding claim, wherein the first channel has a cross-sectional area of between $3,000\ \mu\text{m}^2$ and $10,000\ \mu\text{m}^2$.

~~10. 11.~~ A device having a flowpath therein substantially as hereinbefore described with reference to the appended drawings.