CLAIMS

1. A microfluidic network device (2) including a base portion (4) comprising a plurality of microfluidic inlet channels (12) and at least one common outlet channel (22), and a plurality of valves (36) interconnecting an outlet end (16) of each of the plurality of inlet channels to the at least one common outlet channel, each valve comprising a deflectable member (38) displaceable between a valve closed position in which fluid communication between the inlet channel and outlet channel is closed, and a valve open position in which fluid communication between the inlet channel and common outlet channel is open, the at least one common outlet channel comprises valve sections (24a, 24b) and intermediate sections (26) interconnecting the valve sections, in which each valve section of the at least one common outlet channel is configured to cooperate with a corresponding valve, the valve sections being positioned adjacent respective the outlet ends of the inlet channels, and the valve and intermediate sections are distributed along the at least one common outlet channel, in which each intermediate section interconnects two valve sections.

2. A microfluidic network device according to Claim 1, in which the microfluidic network device is connected to a sampling device (1) arranged downstream of the network device and to which reagents which may include antibodies, imaging buffers, and washing solutions, are supplied.

3. A microfluidic network device according to Claim 1 or 2, in which the outlet ends (16) of adjacent inlet channels (12) are offset such that the plurality of outlet ends (16) are not formed along a straight line, whereby the common outlet channel extends along a generally oscillating path.

4. A microfluidic network device according to Claim 1, 2 or 3, in which the common outlet channel extends generally in a direction transverse to the inlet channels, and in which the valve sections of the common outlet channel extend transversely to the outlet end of the inlet channel, thus forming an “T” shaped arrangement.

5. A microfluidic network device according to any preceding claim, in which the valve comprises a valve inlet orifice (40) formed at the outlet end of the inlet channel, and a valve outlet orifice (42) above, or forming a portion of the common outlet channel, and separated from the valve inlet orifice by a valve separating wall portion (44).

6. A microfluidic network device according to Claim 5, in which the deflectable member extends over the valve inlet orifice, valve separating wall portion, and valve outlet orifice such that when the deflectable member is pressed against the valve separating wall portion, fluid communication between the valve inlet orifice and valve outlet orifice of the valve is prevented.

7. A microfluidic network device according to Claim 5 or 6, in which the valve outlet orifice forms part of the common outlet channel.

8. A microfluidic network device according to Claim 5, 6 or 7, in which the valve outlet orifice has a smaller surface area projecting onto the deflectable member than a surface area projected by the valve inlet orifice on the deflectable member, preferably the surface area of the valve inlet orifice projected on the deflectable member is more than two times the projected surface area of the valve outlet orifice, more preferably more than three times.

9. A microfluidic network device according to any preceding claim, in which the deflectable member comprises an elastic membrane that overlaps the inlet and outlet orifices, the valve separating wall portion, and optionally also edge surfaces bounding the valve inlet and outlet orifices.

10. A microfluidic network device according to any preceding claim, in which the valve body portion comprises actuation chambers (48) that define the deformable portion of the deflectable member that overlaps the orifices (40, 42) and any surface areas around the edges of the orifices, the valve body portion providing a separation between adjacent valves.

11. A microfluidic network device according to any preceding claim, further comprising a valve actuation system (46) comprising pneumatic or hydraulic actuation lines (50) connected to actuation chambers (48) positioned above the valve deflectable members.

12. A microfluidic network device according to any preceding claim, in which an outermost inlet channel (12a) is connected to a washing solution configured to ensure that during washing, between application of different reagents, the common outlet channel is fully washed from one end (22a) to another end (22b) to avoid contamination with liquids of a subsequent treatment cycle.

13. A microfluidic network device according to any preceding claim, in which the microfluidic network device includes a mixing network (30) comprising two or more mixing

channels (32) interconnected by valves (36) to the common outlet channel (22) configured to direct liquid from reagent lines (33) to circulate within the mixing network.

14. A microfluidic network device according to any preceding claim, in which at least one of the plurality of inlet channels comprises flow control portions (20) comprising resistive channels, for instance by a serpentine channel configuration that slows the flow of fluid through the inlet channels.

15. A method of operating a microfluidic network device according to any preceding claim, comprising:

(a) priming each of the inlet channels by injecting respective reagents in each of the inlet channels, while expulsing liquid via either a purge line or the device outlet (34) by controlling respective valves (36) interconnecting the inlet channels to the common outlet channel (22),

(b) priming a sampling device (1) connected downstream to the device outlet, by injecting at least one selected reagent through an inlet channel and out through the outlet, the selected reagent being preferably either a washing agent or a first reagent for treatment of a sample provided in the sampling device,

(c) delivering a reagent configured to react with the sample to the sampling device,

(d) optionally delivering a washing liquid,

(e) optionally repeating steps c and d for different reagents.

16. A method according Claim 15, comprising pre-pressurization of the inlet and outlet of the microfluidic network device, where the inlet and outlet of the microfluidic network are both connected to a pressure source.

17. A method according to Claim 16, in which the pressure on the inlet is varied depending on the desired flow rate.

18. A method according to any of Claims 15 to 17, further comprising mixing of reagents in a mixing network of the microfluidic network device.

19. A microfluidic network device (2) configured to supply reagents to a biological tissue sampling device (1), comprising a plurality of microfluidic inlet channels (12) connected to respective sources of the reagents, at least one common outlet channel (22), and a plurality of

valves (36) interconnecting an outlet end (14) of each of the plurality of inlet channels to the at least one common outlet channel, switchable between a valve closed position in which fluid communication between the inlet channel and outlet channel is closed, and a valve open position in which fluid communication between the inlet channel and common outlet channel is open.

20. A microfluidic network device according to Claim 19, in which the at least one outlet channel comprises valve sections (24a, 24b) interconnected by intermediate sections (26), the valve sections being positioned adjacent to respective the outlet ends of the inlet channels.

21. A microfluidic network device according to Claim 19 or 20, comprising any one or more of the features of a microfluidic network device according to any of Claims 1 to 14.