

Claims

1. A microfluidic chip comprising:
at least one microfluidic reservoir having a wall portion and a heat
5 transfer sealing layer cooperating with the wall portion for receiving a
sample to be tested, the heat transfer sealing layer being arranged to be
contiguous with the sample to be tested;
an active temperature control device arranged to provide structural
support to the heat transfer sealing layer and operable to control a
10 temperature of the sample via transmission of heat through the heat
transfer sealing layer; and
a sensor slot passing through the heat transfer sealing layer, the
sensor slot being adapted to receive a temperature sensor to directly
contact the active temperature device for temperature feedback control
15 to the active temperature control device.
2. A microfluidic chip according to claim 1, wherein the transmission of heat
through the heat transfer sealing layer includes transmission of heat from
the sample to the active temperature control device.
20
3. A microfluidic chip according to claim 1 or claim 2, wherein the heat
transfer sealing layer comprises an adhesive layer or a metallic film, or is
integral with the active temperature control device.
- 25 4. A microfluidic chip according to any one of the preceding claims, wherein
the wall portion defines a first microfluidic reservoir profile and wherein
the first microfluidic reservoir profile comprises a first periodically
oscillating section.
- 30 5. A microfluidic chip according to claim 4, wherein the first microfluidic
reservoir profile further comprises two or more substantially linear

sections and a junction fluidically connecting the two or more substantially linear sections to the first periodically oscillating section.

- 5 6. A microfluidic chip according to any one of claims 1 to 3, wherein the wall portion defines a second microfluidic reservoir profile and wherein the second microfluidic reservoir profile comprises: a first periodically oscillating section; a second periodically oscillating section; a third section arranged between the first and second periodically oscillating sections, the third section having a non-oscillating configuration and comprising a first chamber region; first and second tapering portions which fluidically connect the first and second periodically oscillating sections, respectively, to the first chamber region; and a width, the width being greater at the first chamber region than in the first and second oscillating sections.
- 10 7. A microfluidic chip according to claim 6, wherein each of the first and second tapering portions is curved.
- 15 8. A microfluidic chip according to claim 6, wherein each of the first and second tapering portions is substantially straight.
- 20 9. A microfluidic chip according to claim 6, wherein the third section further comprises a second chamber region, and wherein the microfluidic reservoir profile further comprises third and fourth tapering portions which fluidically connect the first and second periodically oscillating sections to the second chamber region, respectively, wherein the width is greater at the second chamber region than in the first and second periodically oscillating sections.
- 25 10. A microfluidic chip according to any one of claims 1 to 3, wherein the wall portion defines a third microfluidic reservoir profile comprising a first periodically oscillating section arranged to oscillate in a first direction; a
- 30

second periodically oscillating section arranged to oscillate in the first direction; and a third periodically oscillating section positioned between and fluidically connected to the first and second periodically oscillating sections and arranged to oscillate in a second direction which is perpendicular to the first direction.

11. A microfluidic chip according to any one of claims 1 to 3, wherein the wall portion defines a fourth microfluidic reservoir profile and wherein the microfluidic chip further comprises an elastomeric seal arranged to surround the fourth microfluidic reservoir profile and wherein the heat transfer sealing layer cooperates with the wall portion via the elastomeric seal.

12. A microfluidic chip according to any one of the preceding claims, wherein the at least one microfluidic reservoir comprises at least one of a second inlet and a second outlet, the microfluidic chip further comprising an adhesive sealing layer arranged to seal the at least one of the second inlet and the second outlet.

13. A microfluidic chip according to any one of claims 1 to 3 further including a reservoir plate comprising: the wall portion and an edge surface, and wherein the at least one microfluidic reservoir comprises a third inlet comprising an aperture in the edge surface of the reservoir plate.

14. A microfluidic chip according to any one of the preceding claims, comprising:
a plurality of the microfluidic reservoirs, each microfluidic reservoir having a respective wall portion, wherein the heat transfer sealing layer cooperates with each of the respective wall portions for receiving a respective sample to be tested, the heat transfer sealing layer being arranged to be contiguous with each respective sample to be tested, the active temperature control device operable to control a temperature of

each of the respective samples via transmission of heat through the heat transfer sealing layer.

- 5 15. A microfluidic chip according to claim 14, wherein each respective wall portion comprises a through hole.
- 10 16. A microfluidic chip according to claim 14, wherein each respective wall portion defines a respective microfluidic reservoir profile, and wherein at least two of the respective reservoir profiles differ in at least one of shape and sample capacity.
- 15 17. A microfluidic chip comprising:
at least one microfluidic reservoir having a wall portion and a heat transfer sealing layer cooperating with the wall portion for receiving a sample to be tested, the heat transfer sealing layer being arranged to be contiguous with the sample to be tested;
a fluidic heat exchanger operable to control a temperature of the sample via transmission of heat through the heat transfer sealing layer; and
20 a sensor slot passing through the heat transfer sealing layer, the sensor slot being adapted to receive a temperature sensor to directly contact the fluidic heat exchanger for temperature feedback control to the fluidic heat exchanger.
- 25 18. A microfluidic chip according to claim 17, wherein the heat transfer sealing layer includes a metal plate.
- 30 19. A microfluidic system comprising
a microfluidic chip according to any one of claims 1 to 16; and a further at least one microfluidic reservoir comprising a further wall portion, and a further heat transfer sealing layer cooperating with the further wall portion for receiving a further sample to be tested, the further heat transfer sealing layer being arranged to be contiguous with the further sample to

be tested, the further at least one microfluidic reservoir operable to replace the at least one microfluidic reservoir, the active temperature control device being further operable, upon replacement of the at least one microfluidic reservoir with the further at least one microfluidic
5 reservoir, to provide structural support to the further heat transfer sealing layer and to control a temperature of the further sample via transmission of heat through the further heat transfer sealing layer.

20. A microfluidic platform comprising a plurality of fluidically connected
10 microfluidic chips, the plurality of microfluidic chips including one or more microfluidic chips according to any one of the claims 1 to 18.