Claims

1. A biological microfluidics chip comprising:

a substrate;

a microfluidic inlet port defining an opening in a surface of the substrate;

a microfluidic outlet port defining an opening in a surface of the substrate; and

a plurality of wells extending from a top surface of the substrate, wherein each well is bounded by one or more walls, and an inlet opening and an outlet opening are provided in a wall of each of the plurality of wells;

one or more microfluidic inlet channels in the substrate that connect the microfluidic inlet port to each of the inlet openings in the walls of the wells; and

one or more microfluidic outlet channels in the substrate that connect each of the outlet openings in the walls of the wells to the microfluidic outlet port, wherein the microfluidic chip further comprises:

a temperature control inlet port and a temperature control outlet port, and

a temperature control channel configured to transport temperature control fluid from the temperature control inlet port to the temperature control outlet port along a path that is in proximity to one or more of the plurality of wells such that, in use, heat is exchangeable between the temperature control fluid and the contents of the wells,

wherein one or more of the temperature control inlet port, temperature control outlet port and temperature control channels are provided for a subset of the plurality of wells.

2. The biological microfluidics chip of claim 1, wherein the length of a microfluidic channel between the microfluidic inlet port and an inlet opening in the wall of a well is substantially the same for each well.

~~3. The biological microfluidics chip of claim 1 or claim 2, further comprising:~~

~~a temperature control inlet port and a temperature control outlet port, and~~

~~a temperature control channel configured to transport temperature control fluid from the temperature control inlet port to the temperature control outlet port along a path that is in proximity to one or more of the plurality of wells such that, in use, heat is exchangeable between the temperature control liquid and the contents of the wells.~~

~~4. The biological microfluidics chip of claim 3, wherein one or more of the temperature control inlet port, temperature control outlet port and temperature control channels are provided for a subset of the plurality of wells.~~

~~5~~3. The biological microfluidics chip of ~~claim 3 or claim 4~~ any preceding claim, wherein the plurality of wells comprises an array of wells, and a separate temperature control inlet port and temperature control channel are provided for each row of the array of wells.

~~6~~4. The biological microfluidics chip of any preceding claim, wherein the location of the inlet opening in a wall of each of the wells is lower than the outlet opening.

~~7~~5. The biological microfluidics chip of any preceding claim, further comprising:

a second microfluidic inlet port; and

a second inlet opening in the walls of the wells;

wherein the second inlet opening is in fluid communication with the second microfluidic inlet port by a second microfluidic inlet channel.

~~8. The biological microfluidics chip of claim 7;~~ preferably wherein the location of the second inlet opening in the wall of the wells is lower than the outlet opening in the wall of the wells.

~~9~~6. The biological microfluidics chip of any preceding claim, further comprising a lid, wherein the lid is sliding, self-sealing, removable, and/or heated.

~~10~~7. The biological microfluidics chip of any preceding claim, wherein the substrate is, at least in part, D263 glass.

~~11~~8. The biological microfluidics chip of any preceding claim, wherein the plurality of wells have a shape in vertical cross-section comprising two frustoconical shapes end to end, wherein the narrower ends of the frustoconical shapes are collocated~~.~~;

preferably

~~12. The biological microfluidics chip of claim 11,~~ wherein the substrate comprises a top and a bottom layer, and the two frustoconical shapes are collocated at the boundary between the top and bottom layer~~.~~;

preferably

~~13. The biological microfluidics chip of claim 12,~~ wherein the first and/or second microfluidic channels are provided between the top and bottom layer of the substrate.

~~14~~9. The biological microfluidics chip of any preceding claim, wherein one or more of the microfluidic channels comprise a microfluidic valve.

~~15~~10. A method of using a biological microfluidics chip according to one or more of claims 1-~~14~~9, the method comprising:

providing cells, preferably stem cells, embryo's or larvae to one or more of the plurality of wells, wherein the cells, embryo's or larvae are for use in an experiment;

providing a fluid to the microfluidic inlet port such that the fluid enters the one or more wells;

removing a fluid from the one or more wells via the microfluidic outlet port; and

imaging the contents of the one or more wells in order to obtain results of the experiment in the one or more wells.

~~16~~11. A method of claim ~~15~~10, further comprising the steps of

developing the cells, embryo's or larvae in the one or more of the plurality of wells;

optionally expose the cells, embryo's or larvae to drugs or other compounds.

~~17. A method of claims 15-16 in which the cells are stem cells.~~

~~18~~12. A method of claims ~~15~~10-~~17~~11 in which the assay is used for human, animal, micro organism or plant studies or screens.

~~19~~13. A method of claims ~~15~~10-~~17~~11 in which photosynthetic bodies (e.g. plant cells, chloroplasts) are cultured within the plurality of wells.

~~20~~14. The method of any of claims ~~15~~10-~~17~~11, further comprising providing a temperature control fluid to a temperature control inlet port of the biological microfluidics chip in order to control the temperature of the contents of the one or more wells.