port heater was fired to different temperatures. The temperatures were controlled using the PI control module in LABVIEW™. A calibration curve is shown in FIG. **23**. The bottom of the chip was initially at 16° C., obtained by setting the cold chuck to 10° C. By firing the heater to different temperatures different lengths of wax slug could be loaded into the stem channel (FIG. **24**).

For closing the valve a pulse of energy was given to the inlet port and stem channel heaters. This would melt the wax and establish a gradient along the stem channel to move the slug to the desired point. This was done by putting out a high voltage across the heaters, for a specified time. All this was controlled by using relay signals from LABVIEW. A typical temperature response at the inlet port and the valve intersection for a high energy pulse is shown in FIG. **25**. The closing of the valve was characterized by loading a definite amount of wax and moving it in the stem channel. The independent variable for these runs was the energy pulse intensity (voltage) and the pulse duration. For these runs the cold chuck was maintained at 10° C. and a pressure of 15 inches of water was applied at the inlet port. The position where the solid interface was formed relative to the base of the valve was noted (FIG. **26***a*). The experiments were repeated for the 18 V signal intensity and as seen from FIG. **26***b* the results are reproducible.

For smooth opening of the valve the intersection needs to be patterned with an appropriate surface coating to repel the wax. Such a coating can be determined by measuring the contact angle of wax on that surface. The greater the value of the angle the better is the coating. As seen from Table 3.1, the silane treatment, or other silicone-based treatment, is a good candidate for a wax repellant surface.

EXAMPLE 7

Microvalve Array. For having a high valve density in a valving network it is important that the heat effects of one valve are confined to the smallest possible area. One way of doing this is by using a suspended heater configuration where the Silicon under the heater is etched away. The simulation using PDETOOL™ (Partial Differential Equation Toolbox) module of MATLAB™ (Natick, Mass.) show that indeed much steeper temperature gradients can be obtained by using suspended heaters (FIG. **27**).

As can be seen by the forgoing, the present invention provides for devices and methods for the improvement in the design, production and use of valves in microscale devices and, in particular, the movement and control of liquids through microscale devices utilizing the improved valving devices and methodologies of the present invention.

The invention claimed is:

1. A method, comprising:

a) providing, a device, comprising,

i) a meltable material;

ii) an inlet port linked to a gas source, wherein said inlet port is associated with a first heater element;

iii) a stem microchannel comprising a second heater element, wherein said stem microchannel is in fluidic communication with said inlet port;

iv) a main microchannel intersecting said stem microchannel, said main microchannel comprising a third heater element, wherein said intersecting forms a junction;

b) firing said first heater element to load said meltable material into said stem microchannel through said inlet port;

c) firing at least two of said heater elements under conditions such that said meltable material at least partially melts to create a melted plug; and

d) applying pressure with said gas source under conditions such that said melted plug is moved.

2. The method of claim **1**, wherein said junction is configured as a "T" junction.

3. The method of claim **1**, wherein said junction is configured as a "Y" junction.

4. The method of claim **1**, wherein said meltable material is selected from a group consisting of solder, plastic, polymer, electrorheological fluid and wax.

5. The method of claim **1**, wherein said substrate is selected from the group consisting of glass and silicon.

6. The method of claim **1**, wherein said firing of at least two of said heater elements comprise said second and third heater elements.

7. The method of claim **1**, wherein said applying of said gas source comprises a vacuum source, thereby retracting said melted plug out of said junction.

8. The method of claim **1**, wherein said stem microchannel and said main microchannel are disposed in a substrate.

9. The method of claim **1**, wherein said firing of at least two of said heater elements comprise said first and second heater elements and said applying pressure of said gas source comprises generating a positive pressure, thereby moving said melted plug into said junction.

10. The method of claim **9**, wherein said pressure source is an air source.

11. The method of claim **9**, wherein after said melted material moves to said junction, said melted plug is allowed to cool.

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