

changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A microvalve having a magnetic wax plug, the microvalve comprising:

a micro fluidic structure having an inlet portion and an outlet portion;

a magnetic wax plug provided at a predetermined section where the inlet portion and the outlet portion meet, existing in a solid state, melted at a temperature higher than a predetermined temperature, and reversibly moving along a magnetic field, so as to control flux of a fluid through the micro fluidic structure;

a heating portion provided corresponding to the section and heating the magnetic wax plug to be melted; and

a magnetic field application portion selectively applying a magnetic field to a position where the melted magnetic wax plug arrives.

2. The microvalve as claimed in claim 1, wherein the micro fluidic structure comprises a Y-shaped connection portion which connects the inlet portion, the outlet portion, and a vent portion, and the magnetic wax plug is selectively located at the vent portion and the Y-shaped connection portion to allow or restrict flux of a fluid through the inlet portion and the outlet portion according to the location of the magnetic wax plug.

3. The microvalve as claimed in claim 1, wherein the micro fluidic structure further comprises a well portion provided in a lower portion of a position where the inlet portion and the outlet portion meet, inclined downward from the inlet portion toward the outlet portion, and the magnetic wax plug is selectively located at the inlet portion and the well portion to allow or restrict flux of a fluid through the inlet portion and the outlet portion according to the location of the magnetic wax plug.

4. The microvalve as claimed in claim 1, wherein the magnetic wax plug is formed of a mixture of ferrofluid and paraffin wax.

5. The microvalve as claimed in claim 1, wherein the ferrofluid is based on hydrocarbon.

6. The microvalve as claimed in claim 1, wherein the magnetic field application portion is a movable permanent magnet.

7. The microvalve as claimed in claim 1, wherein the magnetic wax plug selectively moves to at least two positions in a melting state, and the magnetic field application portion is a solenoid portion which is provided at at least two positions and selectively operated.

8. A microchip using a magnetic wax which performs a chemical reaction test with a small amount of a liquid test material using a micro fluidic structure formed on a substrate, the microchip comprising:

a micro fluidic structure having a fine channel through which the liquid test material passes; and

a magnetic wax member provided at a predetermined section of the micro fluidic structure, existing in a solid state, melted at a temperature higher than a predetermined temperature, and reversibly moving along a magnetic field, so as to control flux of a fluid through the micro fluidic structure.

9. The microchip as claimed in claim 8, further comprising a heating portion provided in a predetermined section of the micro fluidic structure and heating the magnetic wax member at a temperature higher than the predetermined temperature.

10. The microchip as claimed in claim 8, further comprising a solenoid portion provided at each of at least two positions to which the magnetic wax member selectively moves in a melted state.

11. The microchip as claimed in claim 8, wherein the micro fluidic structure comprises a Y-shaped connection portion which connects an inlet portion, an outlet portion, and a vent portion, and the magnetic wax member is selectively located at the vent portion and the Y-shaped connection portion to allow or restrict flux of a liquid test material through the inlet portion and the outlet portion according to the location of the magnetic wax member.

12. The microchip as claimed in claim 8, wherein the micro fluidic structure comprises an inlet portion, an outlet portion, and a well portion provided in a lower portion of a position where the inlet portion and the outlet portion meet, inclined downward from the inlet portion toward the outlet portion, and the magnetic wax member is selectively located at the inlet portion and the well portion to allow or restrict flux of a liquid test material through the inlet portion and the outlet portion according to the location of the magnetic wax member.

13. The microchip as claimed in claim 8, wherein the magnetic wax member is formed of a mixture of ferrofluid and paraffin wax.

14. The microchip as claimed in claim 13, wherein the ferrofluid is based on hydrocarbon.

15. A microchip unit using a magnetic wax including a microchip which performs a chemical reaction test with a small amount of a liquid test material using a micro fluidic structure formed on a substrate and a driving apparatus portion accommodating and driving the microchip, the microchip comprising:

a micro fluidic structure having a fine channel through which the liquid test material passes; and

a magnetic wax member provided at a predetermined section of the micro fluidic structure, existing in a solid state, melted at a temperature higher than a predetermined temperature, and reversibly moving along a magnetic field, so as to control flux of a fluid through the micro fluidic structure,

wherein the driving apparatus portion comprises:

a heating portion provided to correspond to a predetermined section of the micro fluidic structure and radiating heat to melt the magnetic wax member; and

a magnetic field application portion selectively applying a magnetic field to a position where the melted magnetic wax member arrives.

16. The microchip unit as claimed in claim 15, wherein the magnetic wax member selectively moves to at least two positions in a melting state, and the magnetic field application portion is a solenoid portion which is provided at at least two positions and selectively operated.

17. The microchip unit as claimed in claim 15, wherein the micro fluidic structure comprises a Y-shaped connection portion which connects an inlet portion, an outlet portion, and a vent portion, and the magnetic wax member is selectively located at the vent portion and the Y-shaped connection portion to allow or restrict flux of a liquid test material through the inlet portion and the outlet portion according to the location of the magnetic wax member.

18. The microchip unit as claimed in claim 15, wherein the micro fluidic structure comprises an inlet portion, an outlet portion, and a well portion provided in a lower portion of a