Claims

1. A multi-channel microfluidic blood coagulation detection chip having a five-layer structure, comprising a chip body, wherein the chip body comprises, in sequence from top to bottom, a first-layer chip, a second-layer chip, a third-layer chip, a fourth-layer chip, and a fifth-layer chip; the first-layer chip, the second-layer chip, the third-layer chip, the fourth-layer chip, and the fifth-layer chip cooperate with each other to define a closed microfluidic channel and a plurality of mutually independent detection chambers; the first-layer chip is provided with a sample loading hole, and the sample loading hole communicates with the detection chambers through the microfluidic channel; and the chip body further comprises electrodes, and the electrodes are disposed within the detection chambers in one-to-one correspondence, wherein the electrodes are disposed on the third-layer chip or disposed on the third-layer chip and the fifth-layer chip; and the electrodes comprise reference electrodes and working electrodes, and both the working electrodes and the reference electrodes are disposed on the third-layer chip, or disposed on the third-layer chip and the fifth-layer chip; wherein one end of both the working electrodes and the reference electrodes are located within the detection chambers, and the other end extend to an end head of the third-layer chip or end heads of the third-layer chip and the fifth-layer chip to form detection ends; the plurality of detection chambers corresponding to the branching microfluidic channels are each independently provided therein with one of the working electrodes, which are independently led out to the detection ends; and the reference electrodes in the plurality of detection chambers corresponding to the branching microfluidic channels are all connected together in series and then led out to the detection ends.

2. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim 1, wherein both the microfluidic channel and the detection

chambers run through the second-layer chip and the fourth-layer chip; the microfluidic channel comprises a main flow channel and a plurality of branching microfluidic channels, the tail end of the main flow channel is divided into the plurality of branching microfluidic channels, and the plurality of branching microfluidic channels communicate in one-to-one correspondence with the plurality of mutually independent detection chambers; and the front end of the main flow channel communicates with the sample loading hole.

3. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim 1, wherein both the first-layer chip and the fifth-layer chip are provided with a plurality of vent holes, and the plurality of vent holes are all disposed in one ends of the first-layer chip and the fifth-layer chip at positions corresponding to the detection chambers and correspond one-to-one to the plurality of detection chambers.

4. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim 2, wherein the ~~electrodes are disposed on the third-layer chip or disposed on the third-layer chip and the fifth-layer chip; and the electrodes comprise reference electrodes and working electrodes, and the~~ reference electrodes and the working electrodes are disposed within the detection chambers in one-to-one correspondence.

~~5. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim 2, wherein both the working electrodes and the reference electrodes are disposed on the third-layer chip, or disposed on the third-layer chip and the fifth-layer chip; one ends of both the working electrodes and the reference electrodes are located within the detection chambers, and the other ends extend to an end head of the third-layer chip or end heads of the third-layer chip and the fifth-layer chip to form detection ends; the plurality~~

~~of detection chambers corresponding to the branching microfluidic channels are each independently provided therein with one of the working electrodes, which are independently led out to the detection ends; and the reference electrodes in the plurality of detection chambers corresponding to the branching microfluidic channels are all connected together in series and then led out to the detection ends.~~

~~6~~5. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~5~~1, wherein the reference electrodes comprise a first reference electrode and a second reference electrode, the first reference electrode is separated from the second reference electrode, the first reference electrode is disposed on the front surface of the third-layer chip, and the second reference electrode is disposed on the back surface of the third-layer chip or the front surface of the fifth-layer chip.

~~7~~6. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~6~~5, wherein the working electrodes comprise a first working electrode and a second working electrode, the first working electrode is separated from the second working electrode, the first working electrode is disposed on the front surface of the third-layer chip, and the second working electrode is disposed on the back surface of the third-layer chip or the front surface of the fifth-layer chip.

~~8~~7. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~7~~6, wherein one end of the first working electrode and one end of the first reference electrode are both located within the detection chambers on the front surface of the third-layer chip; and the other end of first working electrode and the other end of the first reference electrode both extend beyond the end heads of one end of the first-layer chip and one

end of the second-layer chip on the front surface of the third-layer chip and form a detection end I that is connected to a detection instrument.

~~9~~8. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~8~~7, wherein one end of the second reference electrode and one end of the second working electrode are both located within the detection chambers; and the other end of the second reference electrode and the other end of the second working electrode both extend beyond the end heads of one end of the fourth-layer chip and one end of the fifth-layer chip on the back surface of the third-layer chip and form a detection end II that is connected to the detection instrument, or the other end of the second reference electrode and the other end of the second working electrode both extend beyond the end heads of one end of the third-layer chip and one end of the fourth-layer chip on the front surface of the fifth-layer chip and form a detection end III that is connected to the detection instrument.

~~10~~9. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~9~~8, wherein the detection end III is exposed outside the end head of the detection end I.

~~11~~10. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim 2, wherein every two adjacent branching microfluidic channels among the plurality of branching microfluidic channels corresponding to the main flow channel are of different lengths, so that the plurality of detection chambers to which the plurality of adjacent branching microfluidic channels are connected are arranged in a staggered distribution.

~~12~~11. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~9~~8, wherein the second-layer chip is provided with a liquid receiving port I, the third-layer chip is provided with a liquid receiving port II, the fourth-layer chip is provided with a liquid receiving port III, and the liquid receiving port I, the liquid receiving port II and the liquid receiving port III are all arranged corresponding to the position of the sample loading hole and all communicate with the sample loading hole; the first main flow channel comprises a first main flow channel and a second main flow channel; each branching microfluidic channel comprises a first branching microfluidic channel and a second branching microfluidic channel; the first main flow channel and the first branching microfluidic channel run through the second-layer chip; the second main flow channel and the second branching microfluidic channel run through the fourth-layer chip; one end of the first main flow channel is connected to the liquid receiving port I, and the other end is connected to the plurality of detection chambers through a plurality of the first branching microfluidic channels in one-to-one correspondence; and one end of the second main flow channel is connected to the third liquid receiving port III, and the other end is connected to the plurality of detection chambers through a plurality of the second branching microfluidic channels in one-to-one correspondence.

~~13~~12. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~12~~11, wherein the first main flow channel extends in a horizontal direction to the end away from the liquid receiving port I to be provided with a first branching microfluidic channel I that is connected to a detection chamber I; the first main flow channel extends in a vertical direction to the end away from the liquid receiving port I towards both sides respectively to be provided with a first branching microfluidic channel II and a first branching microfluidic channel III; the first branching microfluidic channel II extends in a

direction parallel to the first main flow channel to both ends respectively to connect to a detection chamber II and a detection chamber III; and the first branching microfluidic channel III extends in the direction parallel to the first main flow channel to both ends respectively to connect to a detection chamber IV and a detection chamber V.

~~14~~13. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~12~~11, wherein the second main flow channel extends in a horizontal direction to the end away from the liquid receiving port III to be provided with a second branching microfluidic channel I that is connected to a detection chamber VI; the second main flow channel extends in a vertical direction to the end away from the liquid receiving port III towards both sides respectively to be provided with a second branching microfluidic channel II and a second branching microfluidic channel III; the second branching microfluidic channel II extends in a direction parallel to the second main flow channel to both ends respectively to connect to a detection chamber VII and a detection chamber VIII; and the second branching microfluidic channel III extends in the direction parallel to the second main flow channel to both ends respectively to connect to a detection chamber IX and a detection chamber X.

~~15~~14. The multi-channel microfluidic blood coagulation detection chip having a five-layer structure according to claim ~~13~~12 or ~~14~~13, wherein the sizes of the liquid receiving port I, the liquid receiving port II, and the liquid receiving port III are all greater than or equal to the size of the sample loading hole; the plurality of vent holes are all disposed above positions tangent to the tail ends of the plurality of detection chambers; and the number of the vent holes on both the first-layer chip and the fifth-layer chip is five.