CLAIMS

1、A micro-droplet generating system characterised in that it comprises, comprises a microfluidic chip and a droplet driving unit connected to the microfluidic chip, wherein the microfluidic chip comprises an upper electrode plate and a lower electrode plate, a fluid channel layer is formed between the upper electrode plate and the lower electrode plate, at least one of the upper electrode plate and the lower electrode plate forms a plurality of suction points, and the suction points are used for adsorbing liquid; the liquid droplet driving unit is used for driving the liquid injected into the fluid channel layer to flow in the fluid channel layer so as to form liquid micro-droplets at the position of the suction point; wherein the suction points are formed by a plurality of electrodes actuated by an electrode layer, adjacent actuated electrodes being spaced apart by the plurality of electrodes not actuated.

2、The micro-droplet generation system of claim 1, characterised in that it comprises, the upper electrode plate comprises an upper plate, a conductive layer and a first hydrophobic layer which are sequentially arranged; The lower plate comprises a second hydrophobic layer, a dielectric layer, the electrode layer and a substrate which are sequentially arranged, the first hydrophobic layer and the second hydrophobic layer are oppositely arranged, the fluid channel layer is formed between the first hydrophobic layer and the second hydrophobic layer, and the electrode layer comprises the plurality of electrodes arranged in an array.

3、The micro-droplet generating system of claim 2, wherein the upper electrode plate forms a hydrophilic point array on one side of the first hydrophobic layer far away from the conductive layer, the hydrophilic points of the hydrophilic point array are the suction points, and adjacent hydrophilic points are arranged at intervals.

4、The micro-droplet generation system of claim 1, wherein each electrode of the said electrode layer is hexagonal and/or square in shape.

5、The micro-droplet generation system of claim 2, wherein the electrode layer comprises a plurality of square electrodes arranged in an array and a plurality of hexagonal electrodes arranged in an array.

6、The micro-droplet generation system of claim 5, wherein the electrode layer comprises a plurality of hexagonal electrodes arranged in an array and a plurality of square electrodes arranged in an array on both sides of the plurality of hexagonal electrodes arranged in an array; wherein the side length of the hexagonal electrode is 50 μm to 2 mm, and the side length of the square electrode is 50 μm to 2 mm.

7、The micro-droplet generation system of claim 5, wherein the electrode layer comprises a plurality of regular-side electrodes arranged in an array and a plurality of hexagonal electrodes arranged in an array on both sides of the plurality of regular-side electrodes arranged in an array; wherein the side length of the hexagonal electrode is 50 μm to 2 mm, and the side length of the square electrode is 50 μm to 2 mm.

8、The micro-droplet generating system of claim 5, wherein the electrode layer comprises a plurality of first square electrodes arranged in an array, a plurality of first hexagonal electrodes arranged in an array, a plurality of second hexagonal electrodes arranged in an array, and a plurality of second square electrodes arranged in an array which are sequentially connected; wherein the 1st square electrode or the side length of the square electrode is 50 μm - 2 mm, the side length of the second square electrode is 1/5-1/2 of the side length of the first square electrode, the side length of the first hexagonal electrode is 50μm - 2mm, and the side length of the second hexagonal electrode is 1/5-1/2 of the side length of the first hexagonal electrode.

9、The micro-droplet generating system of claim 5, wherein the electrode layer comprises a plurality of first hexagonal electrodes arranged in an array, a plurality of second hexagonal electrodes arranged in an array, and a plurality of square electrodes arranged in an array, which are sequentially connected; wherein the 1st square electrode or the side length of the square electrode is 50 μm - 2 mm, the side length of the second square electrode is 1/5-1/2 of the side length of the first square electrode, the side length

of the first hexagonal electrode is 50μm - 2mm, and the side length of the second hexagonal electrode is 1/5-1/2 of the side length of the first hexagonal electrode.

10、A micro-droplet generation system according to any one of claims 1 to 4, characterised in that it comprises, the liquid droplet driving unit is an electrode driving unit connected to the electrode layer and used for controlling opening and closing of the electrode of the electrode layer so as to control the flow of liquid injected into the fluid channel layer in the fluid channel layer and form liquid micro-droplets at the position of the suction point

11、A micro-droplet generation system according to any one of claims 1 to 4, characterised in that it comprises, a liquid injection hole is formed in the center of the microfluidic chip; the liquid injection hole is used for injecting liquid into the fluid channel layer, the microfluidic chip is also provided with a plurality of liquid drain holes. The liquid drain hole is used for discharging excess liquid from the microfluidic chip, the droplet driving unit is a rotary driving unit, and the rotary driving unit is used for driving the microfluidic chip to rotate so that liquid injected into the fluid channel layer forms micro-droplets at the suction point in a spin-coating mode;

wherein the rotation driving unit drives the microfluidic chip to rotate at a rotation speed greater than 0 rpm and less than or equal to 1000 rpm;

wherein the electrode is hexagonal, the side length of the electrode is 50μm - 2mm, and the distance between the first hydrophobic layer and the second hydrophobic layer is 5μm - 600μm.

12、A micro-droplet generation system according to any one of claims 1 to 4, characterised in that it comprises, the microfluidic chip is provided with a first sample injection hole and a first sample drain hole, the first sample injection hole and the first sample drain hole are arranged on a first diagonal line of the microfluidic chip. The droplet driving unit includes a first micropump and a third micropump. The first micropump is connected to the first sample injection hole and is used for injecting liquid into the fluid channel layer so that the fluid channel layer is filled with the liquid, and

the third micropump is connected to the first sample drain hole and is used for extracting the liquid or gas flowing out of the first sample drain hole so as to form micro-droplets at the suction point;

wherein the microfluidic chip is also provided with a second sample injection hole and a second sample drain hole, the second sample injection hole and the second sample drain hole are arranged on a second diagonal line of the microfluidic chip. The droplet driving unit further includes a second micropump and a fourth micropump. The second micropump is connected to the second sample injection hole and used for injecting medium into the fluid channel layer, and the fourth micropump is connected to the second sample drain hole and used for extracting excess liquid or medium flowing out of the second sample drain hole so that the liquid micro-droplets is wrapped by medium formed at the position of the suction point;

wherein the thickness of the upper plate is 0.05 mm to 1.7 mm, the thickness of the substrate is 0.05 mm to 1.7 mm, the thickness of the conductive layer is 10 nm to 500 nm, the thickness of the dielectric layer is 50 nm to 1000 nm, the thickness of the electrode layer is 10 nm to 1000 nm, the thickness of the first hydrophobic layer is 10 nm to 200 nm, and the thickness of the second hydrophobic layer is 10 nm to 200 nm.

13、A micro-droplet generating method is characterized by comprising the following steps of:

Providing a microfluidic chip including an upper plate and a lower plate, a fluid channel layer formed between the upper plate and the lower plate; The lower plate includes an electrode layer including a plurality of electrodes arranged in an array;

Forming a plurality of suction points in the lower plate, the suction points for adsorbing liquid; The suction point is formed by electrodes actuated by the electrode layer, and adjacent actuated electrodes are arranged at intervals through the electrodes which are not actuated;

Injecting a liquid sample into the fluid channel layer, and forming n1 droplets of the liquid sample at a position corresponding to the suction point by controlling opening and closing of the electrode;

Controlling the opening and closing of the electrode to make each of the formed n1 micro-droplets form n2 micro-droplets at the position of the suction point;

Controlling the opening and closing of the electrode to make each of the formed n2 micro-droplets form n3 micro-droplets at the position of the suction point;

Repeatedly controlling opening and closing of the electrodes to form a target number of micro-droplets;

Wherein n1, n2, n3 are positive integers greater than or equal to 2.

14、The method of claim 13, wherein the liquid sample is injected into the fluid channel layer, and the liquid sample forms two droplets at a position corresponding to the suction point by controlling the opening and closing of the electrode;

Controlling the opening and closing of the electrode to make each of the two formed droplets form two droplets at the position of the suction point;

Controlling the opening and closing of the electrode to make each of the two formed droplets form two droplets at the position of the suction point;

Repeatedly controlling the opening and closing of the electrodes to form a target number of micro-droplets.

15、The micro-droplet generation method of claim 13, wherein the liquid sample is injected into the fluid channel layer, and the liquid sample forms three micro-droplets at a position corresponding to the suction point by controlling the opening and closing of the electrode;

Controlling the opening and closing of the electrode to make each of the formed three micro-droplets form three micro-droplets at the position of the suction point;

Controlling the opening and closing of the electrode to make each of the formed three micro-droplets form three micro-droplets at the position of the suction point;

Repeatedly controlling the opening and closing of the electrodes to form a target number of micro-droplets.

16、The method of claim 13, wherein the liquid sample is injected into the fluid channel layer and forms four droplets at a position corresponding to the suction point by controlling the opening and closing of the electrode;

Controlling the opening and closing of the electrode to make each of the four formed droplets form four droplets at the position of the suction point;

Controlling the opening and closing of the electrode to make each of the four formed droplets form four droplets at the position of the suction point;

Repeatedly controlling the opening and closing of the electrodes to form a target number of micro-droplets.

17、A micro-droplet generation method according to claim 13, wherein the electrode is square or hexagonal; wherein the side length of the electrode is 50 μm to 2 mm.

18、The micro-droplet generation method of claim 17, characterised in that it comprises, the upper electrode plate comprises an upper plate, a conductive layer and a first hydrophobic layer which are sequentially stacked; The lower plate further comprises a second hydrophobic layer and a dielectric layer, wherein the second hydrophobic layer, the dielectric layer and the electrode layer are sequentially stacked; The first hydrophobic layer and the second hydrophobic layer are oppositely arranged, and the fluid channel layer is formed between the first hydrophobic layer and the second hydrophobic layer; wherein the distance between the first hydrophobic layer and the second hydrophobic layer is 5 μm to 600 μm.