Claims

1. A fully-automatic chemiluminescence immunoassay analyzer, comprising a base, wherein a reaction cup conveyance module, a robot-arm sample injection module, an incubation module, a manipulator and transit module, a magnetic-separation cleaning module, and a detection module are mutually independently integrated on the base, wherein

the reaction cup conveyance module is used for conveying a reaction cup to a pre-determined position, such that the robot-arm sample injection module is able to add a reaction reagent and a sample separately into the reaction cup;

the manipulator and transit module carries the reaction cup into the incubation module, to incubate the reaction cup;

the reaction cup in the incubation module is carried by the manipulator and transit module to the magnetic-separation cleaning module for cleaning; and the cleaned reaction cup is carried by the manipulator and transit module to the detection module for detection;

the detection module comprises a detection chamber, a PMT, and a photon counter; the reaction cup is carried by the manipulator and transit module to a reaction cup detection seat of the detection chamber; a first trigger solution and a second trigger solution are successively added to the reaction cup respectively through a first trigger solution pipeline and a second trigger solution pipeline, and after reaction, the waste liquid is discharged through a waste liquid discharge pipeline of the detection module; and the PMT and the photon counter are used to collect and convert optical signals into electrical signals, to finally obtain a detection result through analysis; and

the detection module further comprises a motor for trigger solution refilling and waste liquid tube lifting motions, which can drive simple screw rods to move up and down; the simple screw rods are slidably connected to detection module guide rods, to drive the first trigger solution pipeline, the second trigger solution pipeline, and the waste liquid discharge

pipeline to respectively move up and down along the detection module guide rods; the detection module guide rods are connected to a guide rod fixing block, and are further respectively connected to the first trigger solution pipeline, the second trigger solution pipeline, and the waste liquid discharge pipeline through a connecting piece; and a limit stopper is disposed on the connecting piece and cooperates with an optocoupler, for limiting an upward motion.

2. The fully-automatic chemiluminescence immunoassay analyzer according to claim 1, wherein the manipulator and transit module comprises a first manipulator, a second manipulator, and a transit device; the first manipulator is used for carrying the reaction cup in the incubation module to the magnetic-separation cleaning module for cleaning, and carrying it again to the transit device; and the second manipulator is used for carrying the reaction cup on the transit device to the detection module for detection.

3. The fully-automatic chemiluminescence immunoassay analyzer according to claim 2, wherein the first manipulator and the second manipulator both have a gripping jaw used for carrying the reaction cup; the gripping jaw is disposed on a gripping jaw retractable rack and the gripping jaw retractable rack is controlled by a retractable motion motor; a slider is connected to the retractable motion motor, and is driven by an up-and-down motion motor to drive the gripping jaw to move up and down; and a rotation shaft is further connected to the retractable motion motor and is driven by a rotary motion motor to rotate, thus driving the gripping jaw to rotate.

4. The fully-automatic chemiluminescence immunoassay analyzer according to claim 3, wherein the first manipulator is further provided with an operating base; a first-manipulator horizontal motion screw rod is sleeved on the operating base, and is driven by a first-manipulator horizontal motion motor, such that the first manipulator is able to move back and forth along a first-manipulator horizontal motion guide rail.

5. The fully-automatic chemiluminescence immunoassay analyzer according to claim 2, wherein the transit device comprises a transit base which is provided with several cup hole sites for accommodating the reaction cups, and a transit rotary motor is disposed below the transit base and used for driving the transit base to make a corresponding rotary motion.

6. The fully-automatic chemiluminescence immunoassay analyzer according to claim 1, wherein the robot-arm sample injection module comprises a first sampling device disposed with a sampling needle assembly and a second sampling device disposed with a pipette tip assembly; the first sampling device is used for drawing the reaction reagent and adding it to the reaction cup, and the second sampling device is used for drawing the sample and adding it to the reaction cup; and the robot-arm sample injection module further comprises a transverse motion assembly, a longitudinal motion assembly, and an up-and-down motion assembly, wherein the transverse motion assembly drives the first sampling device and the second sampling device separately to make a transverse motion, the longitudinal motion assembly drives the first sampling device and the second sampling device separately to make a longitudinal motion, and the up-and-down motion assembly drives the first sampling device and the second sampling device separately to make an up-and-down motion.

7. The fully-automatic chemiluminescence immunoassay analyzer according to claim 6, wherein the transverse motion assembly comprises a first transverse motion motor which drives a first transmission shaft to rotate, and drives the first sampling device via the first transmission shaft to move transversely on a first transverse motion shaft; and the transverse motion assembly further comprises a second transverse motion motor which drives a second transmission shaft to rotate and drives the second sampling device via the second transmission shaft to move transversely on a second transverse motion shaft.

8. The fully-automatic chemiluminescence immunoassay analyzer according to claim 7, wherein the longitudinal motion assembly comprises a first longitudinal motion motor which

drives the first sampling device to move longitudinally along a first longitudinal motion shaft and a second longitudinal motion shaft; and the longitudinal motion assembly further comprises a second longitudinal motion motor which drives the second sampling device to move longitudinally along a third longitudinal motion shaft and a fourth longitudinal motion shaft.

9. The fully-automatic chemiluminescence immunoassay analyzer according to claim 8, wherein the up-and-down motion assembly comprises a first up-and-down motion motor, the sampling needle assembly and a first up-and-down motion slider are connected, the first up-and-down motion slider is sleeved on a first up-and-down motion screw rod, the first up-and-down motion motor drives the first up-and-down motion screw rod to move, and the first up-and-down motion slider on the first up-and-down motion screw rod drives the sampling needle assembly to move up and down along a first guide rail; the up-and-down motion assembly further comprises a second up-and-down motion motor, the pipette tip assembly and a second up-and-down motion slider are connected, the second up-and-down motion slider is sleeved on a second up-and-down motion screw rod, the second up-and-down motion motor drives the second up-and-down motion screw rod to move, and the second up-and-down motion slider on the second up-and-down motion screw rod drives the pipette tip assembly to move up and down along a second guide rail.

10. The fully-automatic chemiluminescence immunoassay analyzer according to claim 1, wherein the reaction cup conveyance module comprises a reaction cup conveyance chamber, and the reaction cup falling from the reaction cup conveyance chamber is adjusted in posture by means of a reaction cup flipper; and the reaction cup conveyance module further comprises a reaction cup carrier which pushes the reaction cup after posture adjustment to a designated position, wherein a moving track of the reaction cup carrier is below the incubation module.

11. The fully-automatic chemiluminescence immunoassay analyzer according to claim 10, wherein the reaction cup slides in along a reaction cup cassette holder, and a reaction cup transfer bracket is located on the bottom portion of the reaction cup conveyance chamber; a reaction cup transfer groove that fits the reaction cup cassette holder is disposed on the reaction cup transfer bracket, and the reaction cup transfer bracket moves back and forth with the synergy of a cup transfer fitting groove; and the reaction cup in the reaction cup conveyance chamber enters the reaction cup transfer groove and then falls into the reaction cup flipper.

12. The fully-automatic chemiluminescence immunoassay analyzer according to claim 11, wherein the robot-arm sample injection module adds the reaction reagent and the sample separately to the reaction cup which is pushed by the reaction cup carrier to the designated position, and then the manipulator and transit module carries the reaction cup into an incubation base of the incubation module; and the incubation base is secured on an incubation base vertical panel, wherein an incubation sheet is disposed on the bottom of the incubation base and insulating sheets are respectively disposed at the two sides of the incubation base.

13. The fully-automatic chemiluminescence immunoassay analyzer according to claim 1, wherein the magnetic-separation cleaning module comprises a magnetic-separation cleaning needle, and a rotatable magnetic-separation seat is disposed below the magnetic-separation cleaning needle, the magnetic-separation seat having at least one reaction cup hole; and the magnetic-separation cleaning module further comprises a magnetic cleaning pool, wherein the magnetic cleaning pool comprises a cleaning solution path and a cleaning needle liquid discharge path, a cleaning solution enters through a cleaning solution inlet in the cleaning solution path and then goes into the reaction cup through a cleaning solution pointed outlet for cleaning; and the magnetic-separation cleaning needle is used for discharging the waste liquid in the reaction cup after cleaning through the cleaning needle liquid discharge path.

14. The fully-automatic chemiluminescence immunoassay analyzer according to claim 13, wherein an up-and-down motion of the magnetic-separation cleaning needle is controlled by a magnetic-cleaning lifting motor; the magnetic-separation cleaning module is further disposed with a lifting limit structure; the lifting limit structure comprises a magnetic-cleaning lifting upper plate and a magnetic-cleaning lifting lower plate, wherein a limit optocoupler, a cleaning needle lifting stopper, a lifting screw rod, and a guide rod are disposed between the magnetic-cleaning lifting upper plate and the magnetic-cleaning lifting lower plate; a slider is slidably connected on the lifting screw rod, the magnetic-cleaning lifting motor drives the lifting screw rod to rotate, the slider is connected to the guide rod and the magnetic-separation cleaning needle, and the magnetic-separation cleaning needle is driven by the slider to move up and down along the guide rod.

15. The fully-automatic chemiluminescence immunoassay analyzer according to claim 14, wherein the magnetic-separation seat is driven by a magnetic-separation seat rotary motor to rotate, and a rotation limit structure is disposed below the magnetic-separation seat rotary motor; and a magnet is disposed inside the magnetic-separation seat.

16. The fully-automatic chemiluminescence immunoassay analyzer according to claim 1, wherein when the reaction cup is carried by the manipulator and transit module into the reaction cup detection seat of the detection chamber, a detection chamber baffle moves so that a reaction cup transfer hole and a baffle through hole on the detection chamber baffle coincide, and then the reaction cup is put in; a reaction cup lifting control motor drives a motor rotation connecting pillar to rotate, to drive a lift rod carrier connecting block to move up and down with the synergy of a lift rod movement fitting groove, wherein a lift rod carrier is fixedly connected on the lift rod carrier connecting block; and the lift rod carrier is connected to a reaction cup lift rod, and the reaction cup lift rod moves up and down to take the reaction cup into the reaction cup detection position.

17. The fully-automatic chemiluminescence immunoassay analyzer according to claim 16, wherein the detection chamber baffle is mounted below a detection chamber top cover; the baffle motion motor drives a baffle motor rotation connecting pillar to rotate, such that the detection chamber baffle moves back and forth with the synergy of a baffle motion fitting groove; and accordingly, the baffle through hole on the detection chamber baffle and the reaction cup transfer hole coincide or are misaligned, to open or close the detection chamber.

18. The fully-automatic chemiluminescence immunoassay analyzer according to claim 17, wherein the first trigger solution pipeline, the second trigger solution pipeline, and the waste liquid discharge pipeline all run through the detection chamber top cover; the trigger solution is added to the reaction cup in the reaction cup detection seat; and the waste liquid discharge pipeline is relatively long, and is able to stick into the liquid level in the reaction cup for liquid drawing and discharge.