

Claims

1. A biochip carrying a chemical entity and a code, wherein the code has a unique corresponding relationship with the biochip;

wherein the chemical entity is a linker molecule capable of initiating a DNA/RNA synthesis reaction, preferably a linker molecule having a functional group reacting with an amino group on a beginning end and having hydroxyl protected with an acid-labile protecting group on a terminal, more preferably Universal Linker; or

wherein the chemical entity is a linker molecule capable of initiating a polypeptide synthesis reaction, preferably a linker molecule having a functional group reacting with an amino group on a beginning end and having a functional group coupling with carboxyl of an amino acid monomer on a terminal and capable of being dissociated when in acid treatment finally after the polypeptide synthesis reaction is finished, more preferably 4-hydroxymethyl benzoic acid.

2. A method for preparing the biochip according to claim 1, the method comprising the following steps:

- 1) coding the biochip;
- 2) pretreating the biochip;
- 3) performing silanization treatment on the surface of the biochip;
- 4) chemically modifying the surface of the biochip; and
- 5) optionally, detecting or quantitatively analyzing the chemical modification.

3. The method according to claim 2, wherein the pretreating comprises acid treatment, alkali treatment, ultrasonic treatment, plasma cleaning, acetone washing or a combination thereof, wherein the acid is selected from sulfuric acid, hydrochloric acid, phosphoric acid and piranha liquid, the alkali is selected from sodium hydroxide and potassium hydroxide; preferably, the pretreatment method is acid treatment followed by plasma cleaning; more preferably, the pretreatment method is sodium hydroxide treatment followed by plasma cleaning and acetone washing.

4. The method according to claim 2, wherein chemical modification on the surface of the biochip is achieved by linking the chemical entity on the surface of the biochip.

5. The method according to claim 2, wherein a 2-dimensional bar code is printed on the biochip by means of laser printing, preferably, coding is carried out using red laser through a dot 2-dimensional bar code mode.

6. The method according to claim 2, wherein silanization treatment is performed on the surface of the biochip by soaking the biochip in a silanizing reagent and carrying out ultrasonic treatment, preferably, the silanizing reagent comprises APTES and PTES.

7. The method according to claim 6, wherein the silanizing reagent is a 50% silanizing reagent.

8. A method for synthesizing a nucleic acid, comprising the following steps:

(1) providing the biochip according to claim 1 or the biochip prepared by using the method according to any one of claims 2 to 7, wherein the code carried on the biochip corresponds to a sequence of the nucleic acid to be synthesized;

(2) providing four reaction tanks which are respectively used for addition of deoxyribonucleotides A, T, C and G or ribonucleotides A, U, C and G, and for deprotection, capping, oxidation and washing in each of the reaction tanks;

(3) recognizing the code carried on the biochip, and determining the deoxyribonucleotide or ribonucleotide to be added according to the sequence corresponding to the code, and sorting the biochips with the same deoxyribonucleotide or ribonucleotide to be added into the same reaction tank;

(4) adding a deprotection reagent in the reaction tank, soaking the biochip in the reaction tank for deprotection, and discharging the deprotection reagent after the reaction is completed;

(5) adding a coupling reagent of corresponding deoxyribonucleotide or ribonucleotide into the reaction tank, soaking the biochip in the reaction tank for coupling reaction, and discharging the coupling reagent after the reaction is completed;

(6) adding a capping reagent in the reaction tank, soaking the biochip in the reaction tank for capping reaction, and discharging the capping reagent after the reaction is completed;

(7) adding an oxidizing reagent in the reaction tank, soaking the biochip in the reaction tank for oxidizing reaction, and discharging the oxidizing reagent after the reaction is completed, thereby completing addition of one nucleotide;

(8) according to the sequence of nucleic acid to be synthesized corresponding to the code, repeating steps (3)~(7) once or more times, thereby generating a nucleic acid having a predetermined sequence on the biochip;

optionally, the method further comprises the following steps:

(9) cutting the nucleic acid from the biochip, thereby obtaining the nucleic acid.

9. The method according to claim 8, wherein before the nucleic acid synthesis and after the biochip is sorted to the reaction tank, the capping reagent is added in the reaction tank, and the biochip is soaked in the reaction tank for capping reaction.

10. The method according to claims 8 or 9, wherein a plurality of chips are simultaneously used to perform synthesis reaction.

11. A method for high-throughput screening of an antibody, wherein the method comprises the following steps:

(1) mixing a plurality of chips, wherein the chip is the biochip according to claim 1 or the biochip prepared by the method according to any one of claims 2 to 7, and each chip is modified with a specific antigen and carries a unique code;

(2) soaking the plurality of chips in a sample solution to be detected and sufficiently reacting;

(3) removing the sample solution and washing the chip;

(4) recognizing the code carried on each of the chips, and separating each of the chips from each other according to the code; and

(5) desorbing the antibody binding to the chip from the antigen on the chip, and identifying to the obtained antibody.

12. A method for high-throughput detection of an antigen, comprising the following steps:

(1) mixing a plurality of chips, wherein the chip is the biochip according to claim 1 or the biochip prepared by the method according to any one of claims 2 to 7, and each chip is modified with a specific antibody and carries a unique code;

(2) soaking the chip in a sample solution to be detected and sufficiently reacting;

(3) removing the sample solution and washing the chip;

(4) recognizing the code carried on each of the chips, and separating each of the chips from each other according to the code; and

(5) desorbing the antigen binding to the chip from the antibody on the chip, and identifying the obtained antigen.

13. The method according to claims 11 or 12, wherein in step (4), the biochip is sorted by recognizing the code carried on each biochip, and each chip is moved to a different reaction container through a drive device being configured to drive the movement of the chip.

14. The method according to claim 13, wherein a desorption reagent is added into the reaction container containing the sorted chip to cause desorption of the antigen and the antibody.