WHAT IS CLAIMED IS:

1. A photolithography method based on bilayer photoresist, characterized in that the method comprises the following steps:

(1) spin coating one layer of positive photoresist on a substrate, and drying the positive photoresist; further spin coating one layer of negative photoresist on the positive photoresist, and drying the negative photoresist;

(2) exposing two layers of photoresists using photolithography masks with mask patterns or through focused direct write under a source of exposure, wherein the two layers of photoresists respond differently to the exposure flux at a specific wavelength, so as to form exposure patterns of different sizes on the negative photoresist and the positive photoresist respectively, such that the exposure pattern of the positive photoresist is larger than the exposure pattern of the negative photoresist, and then drying the negative photoresist and the positive photoresist;

（3） developing the negative photoresist with developer for negative photoresist;

(4) controllably developing the positive photoresist with developer for the positive photoresist to merely wash away the portion of the exposure pattern of the positive photoresist that is larger than the exposure pattern of the negative photoresist and uncover the substrate;

(5) forming patterns on the substrate through material deposition technology or etching technology;

(6) removing the remaining positive and negative photoresists.

2. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

transforming the mask patterns to patterns of contour lines by performing step (4),

transferring the pattern of contour lines to the substrate by performing step (5).

3. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the process of spin coating comprises: spin coating at a rotation speed of 500 to 8000 rpm, and the temperature for drying after the spin coating is 30 to 300 ℃.

4. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the exposing is in the form of single exposure.

5. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the exposing is in the form of multiple exposures.

6. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the source of exposure include ultraviolet light source, deep ultraviolet light source, extreme ultraviolet light source, ion beam, electron beam or X-ray.

7. The photolithography method based on bilayer photoresist according to claim 1 or 6, characterized in that:

a wavelength of the source of exposure is 1 to 500 nm, and the temperature for the drying after the exposing is 30 to 300 ℃.

8. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the positive photoresist includes positive ultraviolet photoresist, positive deep ultraviolet photoresist, positive extreme ultraviolet photoresist, positive electron beam photoresist, positive ion beam photoresist or positive X-ray photoresist;

the negative photoresist includes negative ultraviolet photoresist, negative deep ultraviolet photoresist, negative extreme ultraviolet photoresist, negative electron beam photoresist, negative ion beam photoresist or positive X-ray

photoresist.

9. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

a feature line width or feature dimension of the mask patterns is 2 nm to 1000 μm.

10. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the material deposition technology includes electrochemical deposition, electroplating, CVD deposition, laser sputtering, magnetron sputtering, thermal evaporation, electron beam evaporation or atomic deposition;

the etching technology includes wet etching including electrochemical etching or selective etching liquid etching or dry etching including ion etching or chemical reactive ion etching.

11. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

in step (2), exposing, by means of projection exposure and under the source of exposure, the two layers of photoresist through a photolithography mask with mask patterns.

12. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

in step (2), exposing, by means of masking exposure and under the source of exposure, the two layers of photoresist through a photolithography mask with mask patterns.

13. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

in step (2), exposing, by means of reflection exposure and under the source of exposure, the two layers of photoresist through reflecting on a photolithography mask with mask patterns.

14. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the focused direct write includes ultraviolet direct write, deep ultraviolet direct write, extreme ultraviolet direct write, ion beam direct write, electron beam direct write or X-ray direct write.

15. The photolithography method based on bilayer photoresist according to claim 1, characterized in that:

the material of the substrate includes semiconductor, metal, insulator, polymer or composite material.