Claims

1. A film bulk acoustic resonator, comprising a substrate, wherein two opposite protective walls protruding out of a surface of the substrate are arranged on the substrate, a cavity is formed between the two protective walls, and an insulating layer is further arranged on one side, away from the cavity, of each protective wall on the substrate; and

the film bulk acoustic resonator further comprises a transducer stacking structure, wherein the transducer stacking structure covers the insulating layer, the cavity and the protective walls, and two sides, along a stacking direction, of the transducer stacking structure are in communication with the cavity and an outside respectively;

wherein the transducer stacking structure comprises a seed layer, a bottom electrode layer, a piezoelectric film layer, a mass loading layer, a top electrode layer, and a passivation layer stacked in sequence, and the seed layer is close to the insulating layer, the bottom electrode layer partially covers the seed layer, the mass loading layer partially covers the piezoelectric film layer, and the top electrode layer fully covers the mass loading layer and partially covers the piezoelectric film layer.

2. The film bulk acoustic resonator according to claim 1, wherein a through release channel along the stacking direction is arranged on the transducer stacking structure, and the release channel is in communication with the cavity.

3. The film bulk acoustic resonator according to claim 1, wherein ends of the bottom electrode layer and the top electrode layer along a first direction are arranged obliquely, an inclination angle between the end of the bottom electrode layer and a horizontal plane and an inclination angle between the end of the top electrode layer and the horizontal plane are less than 30°, and the first direction is perpendicular to the stacking direction.

4. The film bulk acoustic resonator according to claim 1, wherein an angle between an end of the top electrode layer and a horizontal plane is 90°.

5. The film bulk acoustic resonator according to claim 3, wherein material of the bottom electrode layer and material of the top electrode layer both comprise any one of platinum, aluminum, tungsten or molybdenum.

6. The film bulk acoustic resonator according to claim 1, wherein an inclination angle of each of the protective walls ranges from 75° to 90°.

7. The film bulk acoustic resonator according to claim 2, wherein a cross-sectional shape of the release channel in a horizontal plane comprises circular or elliptical or polygonal section.

8. A manufacturing method for a film bulk acoustic resonator, comprising:

etching, on a substrate, two protective walls protruding out of a surface of the substrate;

forming, on the substrate, an insulating layer, wherein a surface of the insulating layer flushes with a surface of each protective wall at a side far away from the substrate;

forming a transducer stacking structure on the insulating layer, wherein the transducer stacking structure is in communication with an insulating layer area between the two protective walls; and

corroding the insulating layer area between the two protective walls to form a cavity after the insulating layer area between the two protective walls is corroded;

wherein the transducer stacking structure comprises a seed layer, a bottom electrode layer, a piezoelectric film layer, a mass loading layer, a top electrode layer, and a passivation layer stacked in sequence, and the seed layer is close to the insulating layer, the bottom electrode layer partially covers the seed layer, the mass loading layer partially covers the piezoelectric film layer, and the top electrode layer fully covers the mass loading layer and partially covers the piezoelectric film layer.

9. The manufacturing method for a film bulk acoustic resonator according to claim 8, wherein the corroding the insulating layer area between the two protective walls to form a cavity after the insulating layer area between the two protective walls is corroded comprises:

forming a release channel, which connects an outside and the insulating layer area between the two protective walls, on the transducer stacking structure; and

releasing etching liquid or etching gas through the release channel, so as to corrode the insulating layer area between the two protective walls to form the cavity.

10. The manufacturing method for a film bulk acoustic resonator according to claim 8, wherein an inclination angle of each of the protective walls ranges from 75° to 90°.

11. The manufacturing method for a film bulk acoustic resonator according to claim 8, wherein the piezoelectric layer has a plurality of layers deposited.

12. The manufacturing method for a film bulk acoustic resonator according to claim 11, wherein a projection area of the bottom electrode layer on a horizontal plane covers projection areas of the protective walls on the horizontal plane.

13. The manufacturing method for a film bulk acoustic resonator according to claim 11, wherein a projection area of the top electrode layer on a horizontal plane is less than a projection area of the bottom electrode layer on the horizontal plane.

14. The manufacturing method for a film bulk acoustic resonator according to claim 9, wherein the film bulk acoustic resonator forms an active area, and the release channel is arranged around an outer side of the active area, with a gap provided, wherein the active area refers to an area where the transducer stacking structure coincides with a top electrode layer, a bottom electrode layer, and a piezoelectric layer, and the gap is a distance between the release channel and an edge of the active area .

15. The manufacturing method for a film bulk acoustic resonator according to claim 14, wherein the gap is greater than a quarter of a wavelength, and the wavelength is a ratio of an acoustic velocity of a transverse wave to an operating frequency.

16. The manufacturing method for a film bulk acoustic resonator according to claim 14, wherein a cross-sectional shape of the release channel in a horizontal plane is a circular section.

17. A film bulk acoustic wave filter, comprising a positive electrode, a negative electrode and a plurality of interconnected film bulk acoustic resonators according to claim 1, wherein the positive electrode is connected to a bottom electrode layer or a top electrode layer of one of the film bulk acoustic resonators, and the negative electrode is connected to a top electrode layer or a bottom electrode layer of another one of the film bulk acoustic resonators.

18. The film bulk acoustic wave filter according to claim 17, wherein the film bulk acoustic resonators comprise a plurality of first film bulk acoustic resonators and a plurality of second film bulk acoustic resonators, the plurality of first film bulk acoustic resonators are connected in series, and the plurality of second film bulk acoustic resonators are connected to the plurality of first film bulk acoustic resonators in parallel respectively.