CLAIMS

1. An acoustic resonator comprising:

   a piezoelectric layer;

   a first electrode in contact with a first surface of the piezoelectric layer;

   a plurality of dielectric structures in contact with the first surface of the piezoelectric layer; and

   a second electrode in contact with a second surface of the piezoelectric layer opposite the first surface;

   wherein the first electrode comprises a plurality of electrode structures;

   wherein a dielectric structure of the plurality of dielectric structures is in contact with a pair of neighboring electrode structures of the plurality of electrode structures;

   wherein the first electrode further comprises an electrode bar such that the plurality of electrode structures extends from the electrode bar; and

   wherein the first electrode further comprises one or more additional electrode bars across the plurality of electrode structures such that the first electrode is a mesh.

2. The acoustic resonator according to claim 1,

   wherein a pitch between one pair of neighboring electrode structures of the plurality of electrode structures and a pitch between another pair of neighboring electrode structures of the plurality of electrode structures is equal.

3. The acoustic resonator according to claim 1,

   wherein a pitch between one pair of neighboring electrode structures of the plurality of electrode structures is not equal to a pitch between another pair of neighboring electrode structures of the plurality of electrode structures.

4. The acoustic resonator according to claim 1,

   wherein the dielectric structure covers opposite facing sidewalls of the pair of the neighboring electrode structures.

5. The acoustic resonator according to claim 4,

wherein the dielectric structure extends from between the pair of neighboring electrode structures along the opposite facing sidewalls to over the pair of neighboring electrode structures.

6. The acoustic resonator according to claim 1,

wherein the plurality of electrode structures has a first thickness; and

wherein the plurality of dielectric structures has a second thickness not equal to the first thickness.

7. The acoustic resonator according to claim 1,

wherein the plurality of electrode structures is configured to be applied with a first voltage and the second electrode is configured to be applied with a second voltage different from the first voltage.

8. The acoustic resonator according to claim 1,

wherein the plurality of dielectric structures comprises any one material selected from a group consisting of aluminum oxide (Al_2O_3), silicon nitride (Si_3N_4), silicon dioxide (SiO_2), zinc oxide (ZnO), aluminum nitride (AlN), scandium aluminum nitride (ScAlN), hafnium oxide (HfO_2), titanium oxide (TiO_2), ruthenium oxide (RuO_2), hafnium silicate ($HfSiO_4$), zirconium oxide (ZrO_2), zirconium silicate ($ZrSiO_4$), tantalum oxide (Ta_2O_5), hafnium zirconium oxide ($HfZrO_4$).

9. A method of forming an acoustic resonator, the method comprising:

forming a first electrode in contact with a first surface of a piezoelectric layer;

forming a plurality of dielectric structures in contact with the first surface of the piezoelectric layer; and

forming a second electrode in contact with a second surface of the piezoelectric layer opposite the first surface;

wherein the first electrode comprises a plurality of electrode structures;

wherein a dielectric structure of the plurality of dielectric structures is in contact with a pair of neighboring electrode structures of the plurality of electrode structures;

wherein the first electrode further comprises an electrode bar such that the plurality of electrode structures extends from the electrode bar; and

wherein the first electrode further comprises one or more additional electrode bars across the plurality of electrode structures such that the first electrode is a mesh.

10. The method according to claim 9,

wherein a pitch between one first pair of neighboring electrode structures of the plurality of electrode structures and a pitch between another pair of neighboring electrode structures of the plurality of electrode structures is equal.

11. The method according to claim 9,

wherein a pitch between one pair of neighboring electrode structures of the plurality of electrode structures is not equal to a pitch between another pair of neighboring electrode structures of the plurality of electrode structures.

12. The method according to claim 9,

wherein the dielectric structure covers opposite facing sidewalls of the pair of the neighboring electrode structures.

13. The method according to claim 12,

wherein the dielectric structure extends from between the neighboring electrode structures along the opposite facing sidewalls to over the neighboring electrode structures.

14. The method according to claim 9,

wherein the plurality of electrode structures has a first thickness; and

wherein the plurality of dielectric structures has a second thickness not equal to the first thickness.

15. The method according to claim 9,

wherein the plurality of electrode structures is configured to be applied with a first voltage and the second electrode is configured to be applied with a second voltage different from the first voltage.

16. The method according to claim 9,

wherein the plurality of dielectric structures comprises any one material selected from a group consisting of consisting of aluminum oxide (Al_2O_3), silicon nitride (Si_3N_4), silicon dioxide (SiO_2), zinc oxide (ZnO), aluminum nitride (AlN), hafnium oxide (HfO_2), titanium oxide (TiO_2), ruthenium oxide (RuO_2), hafnium silicate ($HfSiO_4$), zirconium oxide (ZrO_2), zirconium silicate ($ZrSiO_4$), tantalum oxide (Ta_2O_5), hafnium zirconium oxide ($HfZrO_4$).