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;

~~and~~

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 first electrode further comprises an electrode bar such that the plurality of electrode structures extends from the electrode bar~~.

~~5. The acoustic resonator according to claim 4,~~

~~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.~~

~~6.~~4. The acoustic resonator according to claim 1,

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

~~7.~~5. The acoustic resonator according to claim ~~6~~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.

~~8.~~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.

~~9.~~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.

~~10.~~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 ($HfZrO_4$).

~~11.~~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; ~~and~~

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.

~~12.~~10. The method according to claim ~~11~~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.

~~13.~~11. The method according to claim ~~11~~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.

~~14. The method according to claim 11,~~

~~wherein the first electrode further comprises an electrode bar such that the plurality of electrode structures extends from the electrode bar.~~

~~15. The method according to claim 14,~~

~~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.~~

~~16.~~12. The method according to claim ~~11~~9,

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

~~17.~~13. The method according to claim ~~16~~12,

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

~~18.~~14. The method according to claim ~~11~~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.

~~19.~~15. The method according to claim ~~11~~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.

~~20.~~16. The method according to claim ~~11~~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 ($HfZrO_4$).