CLAIMS

1. A method of fabricating an electromechanical device, the method comprising:

providing a first wafer;

forming a circuit arrangement on a first surface of the first wafer;

forming a first electrode on a second surface of the first wafer;

forming a first via structure from the first surface of the first wafer to the second surface of the first wafer, the first via structure electrically connecting the first electrode with the circuit arrangement;

forming a second via structure from the first surface of the first wafer to the second surface of the first wafer, the second via structure electrically connecting the circuit arrangement;

providing a second wafer;

forming a suspended structure on a first surface of the second wafer with a spacing formed between the suspended structure and a second surface of the second wafer;

forming a second electrode on the suspended structure;

forming an interconnect structure on the first surface of the second wafer, the interconnect structure electrically connecting the second electrode; and

bonding the first wafer to the second wafer with the second surface of the first wafer facing the first surface of the second wafer, the second via structure electrically connecting the interconnect structure, and the first electrode and the second electrode forming a capacitive structure.

2. The method according to claim **1**, further comprising:

forming a sealing structure between the first wafer and the second wafer.

3. The method according to claim **1**, further comprising:

forming a coil structure on the first surface of the second wafer.

4. The method according to claim **3**, wherein forming the coil structure comprises:

forming a first metal layer; and

forming a conductive via on the first metal layer and forming a second metal layer on the conductive via.

5. The method according to claim **3**, further comprising:

attaching the first wafer to a transfer wafer with the first surface of the first wafer facing the transfer wafer; and

removing a portion of the first wafer to form the second surface of the first wafer.

6. The method according to claim 1, further comprising:
forming a third via structure from the first surface of the first wafer to the second surface of the first wafer;
forming a multi-layer metal structure on the first surface of the second wafer; and
bonding the first wafer to the second wafer with the third via structure electrically connecting the multilayer metal structure.

7. The method according to claim 1,
wherein the suspended structure, the first electrode on the second surface of the first wafer and the second electrode on the suspended structure form any one of a lateral axis magnetometer, a differential vertical axis accelerometer, a single ended vertical axis accelerometer and a see-saw resonator.

8. The method according to claim 1, further comprising:
forming a cavity on the second surface of the first wafer; and
depositing getter material within the cavity.

9. The method according to claim 8, further comprising:
bonding the first wafer to the second wafer to vacuum-seal the cavity.

10. The method according to claim 9, further comprising:
forming a further suspended structure on the first surface of the second wafer with a further spacing formed between the further suspended structure and the second surface of the second wafer.

11. An electromechanical device comprising:

a first wafer having a first surface and a second surface opposite the first surface;

a circuit arrangement on the first surface of the first wafer;

a first electrode on the second surface of the first wafer;

a first via structure extending from the first surface of the first wafer to the second surface of the first wafer, the first via structure electrically connecting the first electrode with the circuit arrangement;

a second via structure extending from the first surface of the first wafer to the second surface of the first wafer, the second via structure electrically connecting with the circuit arrangement;

a second wafer bonded to the first wafer, the second wafer having a first surface and a second surface opposite the first surface;

a suspended structure on the first surface of the second wafer with a spacing between the suspended structure and the second surface of the second wafer;

a second electrode on the suspended structure; and

an interconnect structure on the first surface of the second wafer, the interconnect structure electrically connecting the second electrode;

wherein the first wafer is bonded to the second wafer with the second surface of the first wafer facing the first surface of the second wafer, the second via structure electrically connecting the interconnect structure and the first electrode and the second electrode forming a capacitive structure.

12. The electromechanical device according to claim **11**, further comprising:

a sealing structure between the first wafer and the second wafer.

13. The electromechanical device according to claim **11**, further comprising:

a coil structure on the first surface of the second wafer.

14. The electromechanical device according to claim **13**, wherein the coil structure comprises:

a first metal layer; and

a conductive via on the first metal layer and a second metal layer on the conductive via.

15. The electromechanical device according to claim **11**, further comprising:

a third via structure extending from the first surface of the first wafer to the second surface of the first wafer;

a multi-layer metal structure on the first surface of the second wafer; and

wherein the first wafer is bonded to the second wafer with the third via structure electrically connecting the multi-layer metal structure.

16. The electromechanical device according to claim **11**, wherein the suspended structure, the first electrode on the second surface of the first wafer and the second electrode on the suspended structure form any one of a lateral axis magnetometer, a differential vertical axis accelerometer, a single ended vertical axis accelerometer and a see-saw resonator.

17. The electromechanical device according to claim **11**, further comprising:

a cavity on the second surface of the first wafer; and getter material within the cavity.

18. The electromechanical device according to claim **17**, wherein the cavity is a vacuum-sealed cavity.

19. The method according to claim **18**, further comprising:

a further suspended structure on the first surface of the second wafer within the vacuum-sealed cavity with a further spacing formed between the further suspended structure and the second surface of the second wafer.

20. The electromechanical device according to claim **19**, wherein the further suspended structure is any one of a vertical axis magnetometer, a lateral axis magnetometer, a differential vertical axis accelerometer, single ended vertical axis accelerometer, a lateral axis accelerometer, a fully differential lateral axis accelerometer, a vertical axis gyroscope, a lateral resonator and a see-saw resonator.