the insulating films are the same. Accordingly, expansion or contraction of the insulating films **22** and **25** offset each other. This reduces the thermal stress imposed upon the conductor **24**. Further, by having the first and second insulating films the same thickness, expansion or contraction of these films offset each other and reduce thermal stress. Additionally, the second insulating film **25** and the first insulating film **22** also prevent oxidation of the conductive film **24**.

The use of oxide films of silicon or tantalum for both the first insulating film **22** and the second insulating film **25** makes it possible to reduce the internal stress of the conductive film **24**. As can be seen in FIGS. **5–7**, the first insulated film **22** has portions thereof directly exposed to the ambient environment and other portions contacting the conductive film **24** or the substrate **21**. This causes different portions of the first insulating film **22** to be exposed to different temperatures. The portions at different temperatures may cause separation or cracks due to different expansions. The inventors have determined that tantalum oxide has much less of a problem with different amounts of thermal expansion as compared to a conventional insulating material such as silicon nitride. Furthermore, covering the sides of the conductive film **24** by the third insulating film **31**, especially by the oxide film of silicon-metal compound or tantalum-metal compounds makes it possible to prevent the conductive film **24** from oxidizing. All of the above features allow the present invention to have a longer life as compared to conventional sensors employing a micro-bridge heater.

The construction of the present invention is applicable to any sensor using a micro-bridge heater including, but not limited to, a gas sensor, humidity sensor, or infrared ray sensor.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A sensor comprising:

a substrate which has a depression on a surface thereof;

a first insulating film made of tantalum oxide formed on said surface of said substrate;

a conductive film used as a sensing portion formed on said first insulating film, said conductive film having a terminal located at each of two ends of the conductive film; and

a second insulating film made of tantalum oxide formed on said conductive film to cover said conductive film, wherein said first insulating film and said second insulating film have a same thickness.

2. A sensor according to claim **1**, wherein:

said conductive film includes platinum.

3. A sensor according to claim **1**, wherein:

said first insulating film has two ends, each of said two ends of the first insulating film being attached to said substrate.

4. A sensor according to claim **1**, wherein said same thickness is 1.0 microns to 1.5 microns.

5. A sensor according to claim **1**, further comprising:

a third insulating film covering sides of the conductive film.

6. A sensor according to claim **5**, wherein:

said third insulating film also covers a top of the second insulating film and sides of the second insulating film, the top of the second insulating film being opposite to a bottom of the second insulating film which contacts the conductive film.

7. A sensor comprising:

a substrate which has a depression on a surface thereof;

a first insulating film made of tantalum oxide formed on said surface of said substrate;

a conductive film used as a sensing portion formed on said first insulating film, said conductive film having a terminal located at each of two ends of the conductive film; and

a second insulating film made formed on said conductive film to cover the conductive film, the second insulating film being made of a same material as the first insulating film is made, a thickness of the second insulating film being equal to a thickness of the first insulating film.

8. A sensor according to claim **1**, further comprising:

a third insulating film covering sides of the conductive film.

9. A sensor according to claim **7**, wherein:

said third insulating film also covers a top of the second insulating film and sides of the second insulating film, the top of the second insulating film being opposite to a side of the second insulating film which contacts the conductive film.

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