first sensor section 21a and omitting the other sensor sections of the second sensor section 21b and the third sensor section 21c.

[0035] As shown in Figure 5, the cantilever section 22a of the first sensor section 21a has an L-shaped Si upper layer 30 formed by an Si thin film. A thin-film piezoresistive layer 29 is formed on the surface of the Si upper layer 30, and Au/Ni thin films 28 and 33 are formed on the piezoresistive layer 29 formed in the base 23a and the movable section 23c. It should be noted that an Si lower layer 32 is provided in the base section 20, and the base 23a of the cantilever section 22a is provided at a predetermined position of the Si lower layer 32 via an SiO_2 layer 31.

[0036] In the cantilever section 22a, the Si upper layer 30 and the piezoresistive layer 29 of the hinge section 23b are formed in a state of a thin film of nm order thickness, and a piezoresistive layer ~~24~~ 29 of the hinge section 23b can function as a piezoelectric element. Here, in the case of the present embodiment, the cantilever section 22a is configured such that, except the hinge section 23b, the base 23a and the movable section 23c are respectively covered by the Au/Ni thin films 28 and 33, so that the resistance value corresponding to the deformation of the hinge section 23b can be measured. That is, the cantilever section 22a is configured such that, when the hinge section 23b is

[0045] Next, as shown in Figure 5, the Au/Ni thin film 28 provided as an electrode in the base section 20 of the sensor element 7, and the wiring area section 6a on the main-body-side flexible substrate 6 are connected to each other by the wire 38, and then the protective film 36 having a thickness of 1 [μm] and made of parylene is formed, by a chemical vapor deposition method (CVD method), on the whole of the main-body-side flexible substrate 6, the wire 38, and the sensor element 7. Thereby, the erected state of the movable section 23c can be maintained by the protective film 36. It should be noted that Figure 11 is an SEM image of the sensor element 7 manufactured by the manufacturing method described above. From the image, it can be confirmed that the first sensor section 21a and the second sensor section 21b are each bent in an L-shape and vertically erected with respect to the base section 20, and that the third sensor section 21c is formed in a beam shape.

[0046] Subsequently, the flat-shaped elastic body 9 is formed so as to cover the whole of the main-body-side flexible substrate 6 provided with the sensor element 7, so that the elastic body 9 prevents the main-body-side flexible substrate 6 from being exposed to the outside. At this time, each of the tongue facing surface 9a and the palate facing surface 9b of the elastic body 9 can be flatly formed. Further, here, Polydimethylsiloxane (PDMS:

was swallowed, it was confirmed that a large peak appear at two places in the waveform representing the front-rear shearing stress applied in the oral cavity front-rear direction x, and hence that the subject EXA performed swallowing twice. On the other hand, as shown in Figure 16(e), when the same amount of increased-viscosity water of 20 [ml] was swallowed, it was confirmed that a large peak appear at three places in the waveform representing the front-rear shearing stress applied in the oral cavity front-rear direction x, and hence that the subject EXA performed swallowing three times.

[0068] From this, it was confirmed that, when the viscosity of the fluid is increased, the number of times of swallowing is increased, but the front-rear shearing stress generated in the oral cavity front-rear direction x is reduced. In this way, it was confirmed that, with the oral cavity sensor 1 which can measure the front-rear shearing stress in the oral cavity front-rear direction x in addition to the vertical pressure in the oral cavity vertical direction z, it is possible to analyze detailed tongue movements which could not be sufficiently analyzed only by the vertical pressure in the oral cavity vertical direction z.

[0069] Further, from Figure 16(c) and ~~(d)~~ (f), it was confirmed that, when the viscosity of the fluid is increased, the left-right shearing stress applied to the palate PL in the oral cavity left-right direction y is

by a denture stabilizer, and verification tests were performed. Figure 25 shows a measurement result of the temperature in the oral cavity, the measurement result being obtained on the basis of the measurement result obtained from the temperature sensor section 52 of the second sensor main body 62b arranged at the palate PL on the deep side of the oral cavity, and shows a temperature change at the time when the subject EXA swallowed an ice cream after about 6 [SEC] from the start of the measurement. Figure 26(a) shows a measurement result obtained from the third sensor section 21c and shows a pressure applied in the oral cavity vertical direction z. Further, Figure 26~~(b)~~(c) shows a measurement result obtained from the second sensor section 21b and shows a left-right shearing stress applied in the oral cavity left-right direction y. Further, Figure 26~~(c)~~(e) shows a measurement result obtained from the first sensor section 21a and shows a front-rear shearing stress applied in the oral cavity front-rear direction x.

[0100] The above (a), (c) and (e) of Figure 26 respectively show measurement results obtained from the second sensor main body 62b before performing the temperature correction. From the measurement results, it was confirmed that the measurement results show that each of them also includes the resistance value change generated by the displacement of the piezoresistive layer due to the temperature change. To cope with this, when,

wherein the wiring body is also covered with the coating film made of the biocompatible material.

4. The oral cavity sensor according to ~~any one of~~ claim 1 ~~to claim 3~~ or claim 2, wherein

the sensor main body is bonded to a palate in the oral cavity by using, as a bonding surface, the coating film on one side, and the coating film on the other side is used as a contact surface to come into contact with the tongue and is arranged so as to face the tongue, and

the bonding surface of the sensor main body and the elastic body are displaced by external force applied from the tongue in the oral cavity.

5. The oral cavity sensor according to ~~any one of~~ claim 1 ~~to claim 4~~ or claim 2, wherein

the sensor element includes a first sensor section deformable in a first direction, a second sensor section deformable in a second direction orthogonal to the first direction, and a third sensor section deformable in a third direction orthogonal to the first direction and the second direction,

wherein each of the first sensor section, the second sensor section, and the third sensor section includes a piezoresistive layer configured to detect, as a resistance value change, a displacement state thereof, and each of resistance value changes generated in the

piezoresistive layers due to movements of the tongue is outputted as an output signal via the wiring body.

6. The oral cavity sensor according to claim 5, wherein the first sensor section, the second sensor section, and the third sensor section are arranged to satisfy a positional relationship between vertexes of a triangle so as to be adjacent to each other and are collectively arranged at a predetermined position in the oral cavity.

7. The oral cavity sensor according to claim 5~~ or claim 6~~, wherein

the sensor element includes a temperature sensor section configured not to be deformed by displacement of the elastic body, the temperature sensor section being configured to allow the resistance value thereof to be changed according to a temperature change, and

the temperature sensor section sends out, as an output signal, a resistance value change generated due to the temperature change.