step is not performed, the results are distorted by convection as in case 2 and the peak current value is at a position deviated from where the peak should be (the position in which the EB is located), whereas in case 3 in which the measurement target elimination step is performed, a current value close to the current value in case 1 which should be acquired can be acquired, thus influences of convection and liquid fluctuations can be eliminated.

[0049] The results of the numerical analysis performed have been described above. By performing the measurement target elimination step as described above in electrochemical measurement in which working electrodes that supply or[1] receive electrons to or[2] from a measurement target to cause an oxidation-reduction reaction and a counter electrode connected to the working electrodes through an external power source are provided in an electrolytic solution containing the measurement target and a measuring voltage is applied between the working electrodes and the counter electrode to measure a current flowing between the working electrodes and the counter electrode in proportion to the amount of the measurement target, the measurement target that exists at least in a range in the electrolytic solution that influences the measurement are entirely eliminated by being oxidized or reduced and the process of production and diffusion thereof is initialized and the state in the electrolytic solution is reset. Accordingly, conditions of production and diffusion of the measurement target can be made uniform among iterations of measurement and among samples measured at a time and therefore measurement conditions can be made uniform by controlling and keeping the duration of the subsequent measurement target diffusion step constant.

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[1] See paragraph 0003.
[2] See paragraph 0003.

[WHAT IS CLAIMED IS]

1. An electrochemical measurement method in which a working electrode (10) that supplies or[1] receives electrons to or[2] from a measurement target to cause an oxidation-reduction reaction and a counter electrode (50) connected to the working electrode (10) through an external power source (71) are provided in an electrolytic solution (41) containing the measurement target, and a measuring voltage is applied between the working electrode (10) and the counter electrode (50) to measure a current that flows between the working electrode (10) and the counter electrode (50) in proportion to the amount of the measurement target,

wherein a measurement target eliminating electrode (20, 21, 22, 23, 24) is provided in the electrolytic solution (41), and

the electrochemical measurement method performs:

a measurement target eliminating step of eliminating the measurement target by applying an eliminating voltage, which has the same polarity as the measuring voltage, between the measurement target eliminating electrode (20, 21, 22, 23, 24) and the counter electrode (50) to oxidize or reduce the measurement target;

a measurement target diffusion step of diffusing a new measurement target after stopping the application of the eliminating voltage; and

an electrochemical measurement step of measuring the current by applying the measuring voltage between the working electrode (10) and the counter electrode (50) after the new measurement target is diffused.

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[1] See paragraph 0003.
[2] See paragraph 0003.

2. The electrochemical measurement method according to claim 1, wherein in the measurement target elimination step, the eliminating voltage is also applied to the working electrode (10).

3. The electrochemical measurement method according to claim 1 or 2,

wherein the measurement target eliminating electrode (20, 21, 22, 23, 24) is provided in the same plane as the working electrode (10).

4. The electrochemical measurement method according to claim 3, wherein the measurement target eliminating electrode (23) is in the form of a ring and disposed around the working electrode (10).

5. The electrochemical measurement method according to claim 3, wherein the measurement target eliminating electrode (24) is in the form of a grid and is disposed around the working electrode (10).

6. The electrochemical measurement method according to claim 3, wherein the measurement target eliminating electrode (21) is disposed so as to completely cover an entire surface around the working electrode (10).

7. The electrochemical measurement method according to claim 1 or 2,

wherein the measurement target eliminating electrode (22) is provided in the electrolytic solution (41), having a three-dimensionally extending structure.

8. The electrochemical measurement method according to claim 7, wherein the measurement target eliminating electrode (22) is in the form of a three-dimensional grid and is disposed above a surface on which the

working electrode (10) is provided in the electrolytic solution (41), separating from the working electrode (10).

9. The electrochemical measurement method according to claim 1 or 2,

wherein the measurement target eliminating electrode (22) includes both of an electrode provided in the same plane as the working electrode (10) and an electrode disposed above the plane at a distance from the working electrode (10) and having a three-dimensionally extending structure.

10. An electrochemical measurement device including: an electrolytic solution well (40) to contain an electrolytic solution (41) and a biological specimen (30, 31) that produces a measurement target in the electrolytic solution (41); a working electrode (10) that is provided in the electrolytic solution well (40) and causes an oxidation-reduction reaction by supplying or[3] receiving electrons to or[4] from the measurement target; a counter electrode (50) provided in the electrolytic solution well (40); measuring voltage applying means (71) for applying a measuring voltage between the working electrode (10) and the counter electrode (50); and current measuring means (73) for measuring a current that flows between the working electrode (10) and the counter electrode (50) in proportion to the amount of the measurement target while the measuring voltage is being applied,

wherein a measurement target eliminating electrode (20, 21, 22, 23,

[3] See paragraph 0003.
[4] See paragraph 0003.

24) that causes an oxidation-reduction reaction by supplying or[5] receiving electrons to or[6] from the measurement target is provided in the electrolytic solution well (40), the measurement target eliminating electrode (20, 21, 22, 23, 24) being provided in the same plane as the working electrode (10) and disposed around the working electrode (10)[7], and

the electrochemical measurement device comprises eliminating voltage applying means (71) for applying an eliminating voltage, which has the same polarity as the measuring voltage, between the measurement target eliminating electrode (20, 21, 22, 23, 24) and the counter electrode (50) while the measuring voltage is not applied between the working electrode (10) and the counter electrode (50).

11. The electrochemical measurement device according to claim 10, wherein the measurement target eliminating electrode (23) is in the form of a ring.

12. The electrochemical measurement device according to claim 10, wherein the measurement target eliminating electrode (24) is in the form of a grid.

13. The electrochemical measurement device according to claim 10, wherein the measurement target eliminating electrode (21) is disposed so as to completely cover an entire surface with a gap that prevents electric conduction with the working electrode (10)[8].

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[5] See paragraph 0034.
[6] See paragraph 0034.
[7] Claim 11 as originally filed.
[8] See paragraph 0035.

14[9]. An electrochemical measurement device including: an electrolytic solution well (40) to contain an electrolytic solution (41) and a biological specimen (30, 31) that produces a measurement target in the electrolytic solution (41); a working electrode (10) that is provided in the electrolytic solution well (40) and causes an oxidation-reduction reaction by supplying or receiving electrons to or from the measurement target; a counter electrode (50) provided in the electrolytic solution well (40); measuring voltage applying means (71) for applying a measuring voltage between the working electrode (10) and the counter electrode (50); and current measuring means (73) for measuring a current that flows between the working electrode (10) and the counter electrode (50) in proportion to the amount of the measurement target while the measuring voltage is being applied,

wherein a measurement target eliminating electrode (20, 21, 22, 23, 24) that causes an oxidation-reduction reaction by supplying or receiving electrons to or from the measurement target is provided in the electrolytic solution well (40), the measurement target eliminating electrode (22) being provided in the electrolytic solution (41) and having a three-dimensionally extending structure, and

the electrochemical measurement device comprises eliminating voltage applying means (71) for applying an eliminating voltage, which has the same polarity as the measuring voltage, between the measurement target eliminating electrode (22) and the counter electrode (50) while the measuring voltage is not applied between the working electrode (10) and the counter electrode (50).

[9] Claim 15 as originally filed with an independent form.

15. The electrochemical measurement device according to claim 14, wherein the measurement target eliminating electrode (22) is in the form of a three-dimensional grid and is disposed above a surface on which the working electrode (10) is provided in the electrolytic solution (41), separating from the working electrode (10).

16[10]. An electrochemical measurement device including: an electrolytic solution well (40) to contain an electrolytic solution (41) and a biological specimen (30, 31) that produces a measurement target in the electrolytic solution (41); a working electrode (10) that is provided in the electrolytic solution well (40) and causes an oxidation-reduction reaction by supplying or receiving electrons to or from the measurement target; a counter electrode (50)provided in the electrolytic solution well (40); measuring voltage applying means (71) for applying a measuring voltage between the working electrode (10) and the counter electrode (50); and current measuring means (73) for measuring a current that flows between the working electrode (10) and the counter electrode (50) in proportion to the amount of the measurement target while the measuring voltage is being applied,

wherein a measurement target eliminating electrode (20, 21, 22, 23, 24) that causes an oxidation-reduction reaction by supplying or receiving electrons to or from the measurement target is provided in the electrolytic solution well (40), the measurement target eliminating electrode (22) includes both of an electrode provided in the same plane as the working electrode (10) and an electrode that is disposed above the plane at a distance from the working electrode (10) and has a three-dimensionally extending structure, and

[10] Claim 17 as originally filed with an independent form.

the electrochemical measurement device comprises eliminating voltage applying means (71) for applying an eliminating voltage, which has the same polarity as the measuring voltage, between the measurement target eliminating electrode (22) and the counter electrode (50) while the measuring voltage is not applied between the working electrode (10) and the counter electrode (50).

17[11]. A transducer in which an electrolytic solution well (40) that can contain an electrolytic solution (41) and a biological specimen immersed in the electrolytic solution (41) is mounted on an LSI chip (100), the transducer being adapted to be used for electrochemical measurement of a measurement target generated from the biological specimen,

wherein first electrodes arranged in an array and provided on the LSI chip (100) and second electrodes provided on the LSI chip (100) in such a way that each of the second electrodes is positioned around each of the first electrodes are positioned in a sensor region (101) defined on a bottom surface of the electrolytic solution well (40), and

a third electrode (130) in the form of a three-dimensional grid is provided above the sensor region (101).

18[12]. The transducer according to claim 17,

wherein the second electrodes are made up of a group of ring-like electrodes.

19[13]. A transducer in which an electrolytic solution well (40) that can contain an electrolytic solution (41) and a biological specimen immersed

[11] This is identical to Claim 19 as originally filed.
[12] This is identical to Claim 20 as originally filed which depends from Claim 19 as originally filed.
[13] This is identical to Claim 21 as originally filed which depends from Claim 18 as originally filed.

in the electrolytic solution (41) is mounted on an LSI chip (100), the transducer being adapted to be used for electrochemical measurement of a measurement target generated from the biological specimen,

wherein first electrodes arranged in an array and provided on the LSI chip (100) and second electrodes provided on the LSI chip (100) in such a way that each of the second electrodes is positioned around each of the first electrodes are positioned in a sensor region (101) defined on a bottom surface of the electrolytic solution well (40), the second electrodes being in the form of a grid.

20[14]. A transducer in which an electrolytic solution well (40) that can contain an electrolytic solution (41) and a biological specimen immersed in the electrolytic solution (41) is mounted on an LSI chip (100), the transducer being adapted to be used for electrochemical measurement of a measurement target generated from the biological specimen,

wherein first electrodes arranged in an array and provided on the LSI chip (100) and second electrodes provided on the LSI chip (100) in such a way that each of the second electrodes is positioned around each of the first electrodes are positioned in a sensor region (101) defined on a bottom surface of the electrolytic solution well (40), the second electrodes being formed in the entire sensor region (101) without electrically connecting to the first electrodes.

21[15]. The transducer according to claim 19 or 20,

wherein a third electrode (130) in the form of a three-dimensional grid is provided above the sensor region (101).

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[14] This is identical to Claim 22 as originally filed which depends from Claim 18 as originally filed.
[15] This is identical to Claim 21 or 22 as originally filed which depends from Claim 19 as originally filed.