

What is claimed is:

1. A method of identifying a defect in a test strip, the test strip including a first electrode in spaced relation to a second electrode, the method comprising:

applying a first test voltage V_1 for a first test time interval T_1 between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the second electrode;

applying a second test voltage V_2 for a second test time interval T_2 , between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the first electrode;

measuring a first test current i_1 and a second test current i_2 that occur during the second test time interval T_2 , the second test current i_2 occurring after the first test current i_1 ; and

determining whether the test strip has the defect using an equation based on the first test current i_1 and the second test current i_2 wherein the equation comprises a ratio between the first test current i_1 and the second test current i_2 .

2. The method of claim 1, wherein the second test voltage V_2 is applied immediately after the first test voltage V_1 .

3. The method of claim 1, wherein the equation comprises a ratio between the first test current i_1 and the difference between the first test current i_1 and the second test current i_2 .

4. The method of claim 1, wherein the first test current i_1 is determined at a beginning of the second time interval T_2 .

5. The method of claim 1, wherein the first test current i_1 is a maximum current value occurring during the second time interval T_2 .

6. The method of claim 1, wherein the second test current i_2 is determined at an end of the second time interval T_2 .

7. The method of claim 1, wherein the second test current i_2 is a minimum current value occurring during the second time interval T_2 .

8. The method of claim 1, further comprising a step of providing an error message indicating a defective test strip if the ratio is greater than a first predetermined threshold.
9. The method of claim 8, wherein the first predetermined threshold is about 1.2.
10. The method of claim 1, wherein the equation is a ratio = $\frac{i_1}{i_1 - i_2}$, where i_1 is the first test current and i_2 is the second test current.
11. The method of claim 1, wherein the first test voltage ranges from zero to -600 mV with respect to the second electrode.
12. The method of claim 1, wherein the second test voltage ranges from 10 mV to 600 mV with respect to the second electrode.
13. The method of claim 1, wherein the defect is a high track resistance R.
14. The method of claim 13, wherein the high track resistance R is between a connection point on a meter and either the first or second electrode of the test strip.
15. A method of identifying a defect in a test strip, the test strip comprising a first electrode and a second electrode in spaced relation, the method comprising:
 - applying a first test voltage V_1 for a first test time interval T_1 , between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the second electrode;
 - applying a second test voltage V_2 for a second test time interval between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the first electrode;
 - measuring a first test current i_1 , a second test current i_2 , a third test current i_3 , and a fourth test current i_4 that occur during the second test time interval T_2 ;
 - calculating a first logarithm of a first ratio based on the first test current i_1 and the second test current i_2 ;
 - calculating a second logarithm of a second ratio based on the third test current i_3 and

the fourth test current i_4 ; and

determining whether the test strip has a defect using an equation based on a third ratio involving the first logarithm and the second logarithm.

16. The method of claim 15, wherein the defect is a leakage of fluid between a spacer and the first electrode.
17. The method of claim 15, wherein a reagent layer is disposed on the first electrode so that a portion of the reagent layer is between the spacer and the first electrode.
18. The method of claim 15, wherein the equation based on a third ratio represented by $\frac{\log(\frac{i_1}{i_2})}{\log(\frac{i_3}{i_4})}$, where i_1 is the first test current, i_2 is the second test current, i_3 is the third test current, and i_4 is the fourth test current.
19. The method of claim 15 further comprising a step of providing an error message indicating a defective test strip if the third ratio is less than a predetermined threshold.
20. The method of claim 19, wherein the predetermined threshold is 1.
21. The method of claim 19, wherein the predetermined threshold is 0.95.
22. The method of claim 15, wherein the first test current i_1 and the second test current i_2 comprise the two largest current values during the second time interval T_2 .
23. The method of claim 15, wherein the fourth test current i_4 is a smallest current value occurring the second time interval T_2 .
24. The method of claim 15, wherein a difference between a fourth test current time and a third test current time is greater than a difference between a second test current time and a first test current time.
25. A method of identifying an error in performing a test with a test strip, comprising: applying a first test voltage V_1 for a first test time interval T_1 between a first

electrode and a second electrode;

measuring consecutively a first test current i_1 , a second test current i_2 , and a third test current i_3 ; and

determining whether an error was performed by using an equation based on the second test current i_2 and a summation of the absolute value of the first test current i_1 and the absolute value of the third test current i_3 .

26. The method of claim 25, wherein a time difference between the measurements of the first test current i_1 and the second test current i_2 ranges from one nanosecond to 100 milliseconds.

27. The method of claim 25, wherein a time difference between the measurements of the first test current i_1 and the third test current i_3 ranges from one nanosecond to 100 milliseconds.

28. The method of claim 25, wherein the equation is $Y = 2 \cdot \text{abs}(i(t)) - \text{abs}(i(t-x)) - \text{abs}(i(t+x))$, where $i(t)$ is the second test current, $i(t-x)$ is the first test current, $i(t+x)$ is the third test current, t is a time, and x is an increment of time, and abs represents an absolute function.

29. The method of claim 25, wherein the equation is $Z = \text{abs}(i(t+x)) - \text{abs}(i(t))$, where $i(t)$ is the second test current, $i(t+x)$ is the third test current, t is a time, and x is an increment of time, and abs represents an absolute function.

What is claimed is:

1. A method of identifying a defect in a test strip, the test strip including a first electrode in spaced relation to a second electrode, the method comprising:

applying a first test voltage V_1 for a first test time interval T_1 between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the second electrode;

applying a second test voltage V_2 for a second test time interval T_2 , between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the first electrode;

measuring a first test current i_1 and a second test current i_2 that occur during the second test time interval T_2 , the second test current i_2 occurring after the first test current i_1 ; and

determining whether the test strip has the defect using an equation based on the first test current i_1 and the second test current i_2 wherein the equation comprises a ratio between the first test current i_1 and the second test current i_2 .

2. The method of claim 1, wherein the second test voltage V_2 is applied immediately after the first test voltage V_1 .

3. The method of claim 1, wherein the equation comprises a ratio between the first test current i_1 and the difference between the first test current i_1 and the second test current i_2 .

4. The method of claim 1, wherein the first test current i_1 is determined at a beginning of the second time interval T_2 .

5. The method of claim 1, wherein the first test current i_1 is a maximum current value occurring during the second time interval T_2 .

6. The method of claim 1, wherein the second test current i_2 is determined at an end of the second time interval T_2 .

7. The method of claim 1, wherein the second test current i_2 is a minimum current value occurring during the second time interval T_2 .

8. The method of claim 1, further comprising a step of providing an error message indicating a defective test strip if the ratio is greater than a first predetermined threshold.
9. The method of claim 8, wherein the first predetermined threshold is about 1.2.
10. The method of claim 1, wherein the equation is a ratio = $\frac{i_1}{i_1 - i_2}$, where i_1 is the first test current and i_2 is the second test current.
11. The method of claim 1, wherein the first test voltage ranges from zero to -600 mV with respect to the second electrode.
12. The method of claim 1, wherein the second test voltage ranges from 10 mV to 600 mV with respect to the second electrode.
13. The method of claim 1, wherein the defect is a high track resistance R.
14. The method of claim 13, wherein the high track resistance R is between a connection point on a meter and either the first or second electrode of the test strip.
15. A method of identifying a defect in a test strip, the test strip comprising a first electrode and a second electrode in spaced relation, the method comprising:
 - applying a first test voltage V_1 for a first test time interval T_1 , between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the second electrode;
 - applying a second test voltage V_1 for a second test time interval between the first electrode and the second electrode of the test strip sufficient to oxidize a reduced mediator at the first electrode;
 - measuring a first test current i_1 , a second test current i_2 , a third test current i_3 , and a fourth test current i_4 that occur during the second test time interval T_2 ;
 - calculating a first logarithm of a first ratio based on the first test current i_1 and the second test current i_2 ;
 - calculating a second logarithm of a second ratio based on the third test current i_3 and

the fourth test current i_4 ; and

determining whether the test strip has a defect using an equation based on a third ratio involving the first logarithm and the second logarithm.

16. The method of claim 15, wherein the defect is a leakage of fluid between a spacer and the first electrode.

17. The method of claim 16, wherein a reagent layer is disposed on the first electrode so that a portion of the reagent layer is between the spacer and the first electrode.

18. The method of claim 15, wherein the equation based on a third ratio represented by $\frac{\log(\frac{i_1}{i_2})}{\log(\frac{i_3}{i_4})}$, where i_1 is the first test current, i_2 is the second test current, i_3 is the third test current, and i_4 is the fourth test current.

19. The method of claim 15 further comprising a step of providing an error message indicating a defective test strip if the third ratio is less than a predetermined threshold.

20. The method of claim 19, wherein the predetermined threshold is 1.

21. The method of claim 19, wherein the predetermined threshold is 0.95.

22. The method of claim 15, wherein the first test current i_1 and the second test current i_2 comprise the two largest current values during the second time interval T_2 .

23. The method of claim 15, wherein the fourth test current i_4 is a smallest current value occurring the second time interval T_2 .

24. The method of claim 15, wherein a difference between a fourth test current time and a third test current time is greater than a difference between a second test current time and a first test current time.

25. A method of identifying an error in performing a test with a test strip, comprising: applying a first test voltage V_1 for a first test time interval T_1 between a first

electrode and a second electrode;

measuring consecutively a first test current i_1 , a second test current i_2 , and a third test current i_3 ; and

determining whether an error was performed by using an equation based on the second test current i_2 and a summation of the absolute value of the first test current i_1 and the absolute value of the third test current i_3 .

26. The method of claim 25, wherein a time difference between the measurements of the first test current i_1 and the second test current i_2 ranges from one nanosecond to 100 milliseconds.

27. The method of claim 25, wherein a time difference between the measurements of the first test current i_1 and the third test current i_3 ranges from one nanosecond to 100 milliseconds.

28. The method of claim 25, wherein the equation is $Y = 2 * \text{abs}(i(t)) - \text{abs}(i(t-x)) - \text{abs}(i(t+x))$, where $i(t)$ is the second test current, $i(t-x)$ is the first test current, $i(t+x)$ is the third test current, t is a time, and x is an increment of time, and abs represents an absolute function.

29. The method of claim 25, wherein the equation is $Z = \text{abs}(i(t+x)) - \text{abs}(i(t))$, where $i(t)$ is the second test current, $i(t+x)$ is the third test current, t is a time, and x is an increment of time, and abs represents an absolute function.