Claims

1. A method for determining at least one membrane property of an analyte sensor, wherein the analyte sensor comprises at least two measurement electrodes, wherein at least one of the measurement electrodes comprises at least one membrane element having at least one membrane property, the method comprising the following steps:
   a) generating at least one fast-transient voltage signal and applying the fast-transient voltage signal to the measurement electrodes at an application time t_0;
   b) measuring a first response signal U_1 at a first time t_1 and a second response signal U_2 at a second time t_2 with $t_0 \neq t_1 \neq t_2$, wherein the application time t_0 precedes the first time t_1 and the second time t_2;
   c) determining a response signal U_0 at the application time t_0 by evaluating the first response signal U_1 and the second response signal U_2;
   d) determining the at least one membrane property by evaluating of the response signal U_0 at the application time t_0.

2. The method according to claim 1, wherein the evaluating of the response signal U_0 in step d) comprises determining equivalent series resistance of the analyte sensor and determining the at least one membrane property from the equivalent series resistance of the analyte sensor.

3. The method according to any one of claims 1 or 2, wherein the first time t_1 is in the range from 1 µs to 5 µs after the application time t_0.

4. The method according to any one of claims 1 to 3, wherein the second time t_2 is in the range from 1 µs to 5 µs after the first time t_1.

5. The method according to any one of claims 1 to 4, wherein the analyte sensor is an in vivo sensor.

6. The method according to any one of claims 1 to 5, wherein the method is performed during in vivo measurement.

7. The method according to any one of claims 1 to 6, wherein the method is performed during manufacturing of the analyte sensor.

8. The method according to any one of claims 1 to 7, wherein the method comprises at least one failsafe step, wherein the failsafe step is triggered depending on the determined membrane property.

9. The method according to any one of claims 1 to 8, wherein the membrane property is permeability of the membrane element.

10. The method according to any one of claims 1 to 9, wherein the fast-transient voltage signal has a square wave form or a sine wave signal form.

11. The method according to any one of claims 1 to 10, wherein the fast-transient voltage signal comprises a non-continuous signal such as a pulse, wherein a pulse duration is $\leq$ 20 µs, preferably $\leq$ 10 µs.

12. A method for determining a concentration of at least one analyte in bodily fluid using at least one analyte sensor, wherein the analyte sensor comprises at least two measurement electrodes, wherein at least one of the measurement electrodes comprises at least one membrane element having at least one membrane property, wherein the method comprises determining at least one membrane property of the analyte sensor according to any one of claims 1 to 11, wherein the method comprises at least one analyte measurement step, wherein in the measurement step the concentration of the analyte is determined.

13. A computer program comprising program means for performing the method according to any one of claims 1 to 11 and/or the method according to claim 12 while the computer program is being executed on a computer or on a computer network.

14. An analytical system for determining a concentration of at least one analyte in bodily fluid, wherein the analytical system comprises at least one analyte sensor, wherein the analyte sensor comprises at least two measurement electrodes, wherein at least one of the measurement electrodes comprises at least one membrane element having at least one membrane property, wherein the analytical system comprises at least one signal generator device configured for generating at least one fast-transient voltage signal, wherein the signal generator device is configured for applying the fast-transient voltage signal to the two measurement electrodes, wherein the analytical system comprises at least one measurement unit configured for measuring a first response signal U_1 at a first time t_1

and a second response signal U_2 at a second time t_2 with $t_0 \neq t_1 \neq t_2$, wherein the application time t_0 precedes the first time t_1 and the second time t_2, wherein the analytical system comprises at least one evaluation device, wherein the evaluation device is configured for determining a response signal U_0 at the application time t_0 by evaluating the first response signal U_1 and the second response signal U_2, wherein the evaluation device is configured for determining the at least one membrane property by evaluating of the response signal U_0 at the application time t_0.

15. The analytical system according to claim 14, wherein the analytical system is configured for performing the method according to any one of claims 1 to 11 and/or the method according to claim 12.