

Thin Film Chip Acetone Gas Sensor for the Application in Diabetic Diagnosis

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In this research, a suitable electrode material and electrolyte were selected. And a best operation condition of this system, such as the current density, potential and concentration, was found. Theoretically, by using electrodes in a suitable electrolyte, acetone reacts with the redox mediator, and then makes acetone be reduced into alcohol form; resulting the reaction current signals.

For the diabetic patients the concentration of breath acetone has been found to correlate with total plasma-ketones, blood-ketones and also correlate to β -hydroxybutyrate (β -HBA) concentration in venous blood. Abnormal acetone concentration in breath air associated with blood-sugar was confirmed [1].

Because acetone is volatile, it can be measured by an acetone gas sensor resulting non-invasive and better index for diabetic diagnosis which equilibrates readily in venous blood and alveolar air. However, the concentrations of the acetoacetate and β -hydroxybutyrate may be affected by muscle and renal metabolism in plasma and urine. Clinical diagnosis in the future, acetone sensor will be possible substituted for the complex methods such as blood photometry or gas and liquid chromatographic (GLC) analysis, and urinalysis via the nitroprusside method [2].

The typical sensing results of the developed acetone gas sensor were shown in the figures. In Figure 1, the results indicate that acetone concentrations in the range from 20 ppm to 80 ppm can be clearly measured. Figure 2 refers to the calibration curve; that a linear relationship between the response current densities and acetone concentrations could be found.

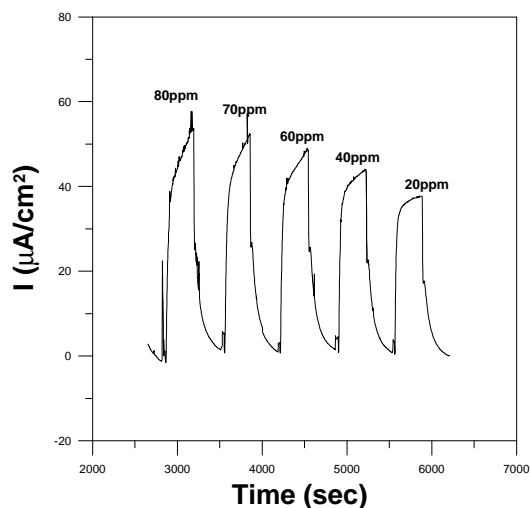


Figure 1. The response current densities of acetone using thin film chip sensor

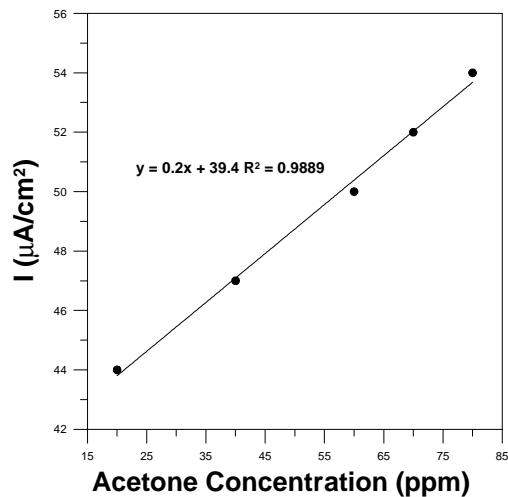


Figure 2. The calibration curve of the acetone concentrations ranging from 20 to 80ppm

Key words:

Thin film chip, acetone gas sensor, diabetic diagnosis

References

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