Metal is a metal complex having a redox potential lower than hydrogen peroxide under physiological conditions;

R^1 is -N*(R)(C=O)-, -N*(R)(C=O)N(R)-, -N*(R)$(CR_2)_n$-, -N*(R)$(CR_2)_n$(C=O)-, -N*(R)(C=O)$(CR_2)_n$-, -N*(R)(C=O)$(CR_2)_n$(C=O)-, -N*(R)$(CR_2)_n$O$(CR_2)_m$-, -N*(R)$(CR_2)_n$S$(CR_2)_m$-, -N*(R)$(CR_2)_n$O-, -N*(R)$(CR_2)_n$(C=O)O-, -N*(R)(C=O)$(CR_2)_n$O-, -N*(R)(C=O)$(CR_2)_n$(C=O)O-, -N*(R)$(CR_2)_n$O$(CR_2)_m$O-, -N*(R)$(CR_2)_n$S$(CR_2)_m$O-, -N*=CH$(CR_2)_n$-, -N*=CH$(CR_2)_n$(C=O)-, -N*=CH$(CR_2)_n$O$(CH_2)_m$-, -N*=CH$(CR_2)_n$S$(CR_2)_m$-, -N*=CH$(CR_2)_n$O-, -N*=CH$(CR_2)_n$(C=O)O-, -N*=CH$(CR_2)_n$O$(CR_2)_m$O-, or -N*=CH$(CR_2)_n$S$(CR_2)_m$O-, wherein N* represents the nitrogen at the 2 position of the 2-amino monosaccharide;

R for each occurrence is independently hydrogen or lower alkyl;

m for each occurrence is independently a whole number selected between 1-20; and

n for each occurrence is independently a whole number selected between 1-20.

Advantageously, the enzyme is immobilized into a thin polymer film (of the enzyme containing polymer) with redox properties on the surface of the working electrode through chemical or non-chemical means.

According to another aspect, there is provided a sensor, comprising: a substrate; a first sensor electrode on the substrate; a first sensing layer on the first sensor electrode, the first sensing layer comprising a first enzyme-containing polymer as defined herein; and a reference electrode on the substrate.

According to an example, there is provided a monitor, comprising: a receiver module configured to receive an output of a sensor as defined herein; a processor module configured to receive a first metabolite concentration value and a first control value from the receiver module, wherein the processor module is configured to: compare the first metabolite concentration value against the first control value; and generate a first signal based on the comparison.

According to another aspect, there is provided a monitor, comprising: a receiver module configured to receive a sensor output of a sensor as defined herein and a control output of another sensor as defined herein; a processor module configured to receive a first metabolite concentration value corresponding to the sensor output and a first control value corresponding to the control output from the receiver module, wherein the processor module is configured to: compare the first metabolite concentration value against the first control value; and generate a first alarm signal on a condition that a difference between the first metabolite concentration value and the first control value is above a first pre-determined value.

According to another aspect, there is provided a monitoring system, comprising: a sensor as defined herein; and a monitor as defined here, wherein the receiver of the monitor is arranged in use to receive an output of the sensor.

According to another aspect, there is provided a method of manufacturing a sensor, comprising: providing a substrate; forming a first sensor electrode on the substrate; forming a first sensing layer on the first sensor electrode, the first sensing layer comprising a first enzyme-containing polymer as defined herein; and forming a reference electrode on the substrate.

According to another aspect, there is provided a method for monitoring failure of a tissue on a patient may comprise of the steps:

(i) providing a first sensor as defined herein on or within said tissue, said first sensor being capable of detecting and measuring the amount of a first metabolite;

(ii) providing a second sensor as defined herein on a control region of said patient, said control region being separate from said tissue and wherein said second sensor is capable of detecting and measuring the amount of said first metabolite;