Revolutionary Non-invasive, Low Cost and Portable Glucose Monitoring System

Advantages
- Noninvasive, non-painful means of monitoring glucose levels in the blood
- Reliable method requiring small samples for monitoring, such a few tears
- Low cost portable detector

Invention
Methods and apparatus for creating a portable noninvasive glucose monitoring system, which includes a sensing solution containing specially designed nanoparticles sensitive to very minute changes in glucose level.

Background
Diabetes mellitus is the sixth-leading cause of death in the U.S. It is a medical disorder characterized by persistent variable hyperglycemia (high blood sugar levels), resulting either from inadequate secretion of the hormone insulin, an inadequate response by the body’s cells to insulin, or a combination of both of these factors. Over the years, high blood glucose damages nerves and blood vessels, leading to complications such as blindness, heart and kidney disease, nerve problems, gum infections, and amputation. Prevention of diabetes related complications is accomplished through strict control of glucose levels in the blood. In the past few decades many different glucose sensors have been developed. Current glucose sensors and methods include near infrared spectroscopy, optical rotation, enzymatic assays, fluorescence detection, and many others. However, none of these sensors is fully non-invasive, most requiring a blood sample.

The current invention provides a non-invasive method of sensing glucose in bodily fluids. Such Fluids include blood, saliva, urine, and tears. However, the concentration of glucose in tears shows to correlate best with blood glucose concentration. The sensor determines glucose concentration based upon the bodily fluids interaction with nanoparticles and metal salts present in the sensing solution. This solution is stored in a small cel (sample container), which the bodily fluid is introduced into. The absorbance spectrum of this mixture is then measured using a UV spectrometer, which can as small as a cell phone. The fluids interaction with the sensing solution will produce a change in the solution’s absorption spectrum, which can then be correlated to the glucose levels present in the blood. This sensing solution in conjunction with an extremely small, portable detector will provide a simple, low cost and noninvasive means of monitoring glucose levels in the blood. In addition, using this method, potential diabetic problems can be detected before diabetes has been diagnosed.

Application
The portable detector, sample cel and sensing solution can be utilized for highly sensitive monitoring of glucose levels in the various bodily fluids. Manufacturers of glucose monitoring devices could utilize this technology to provide revolutionary new lines of noninvasive products.

Lead Inventors
F.E. Hernandez PhD.