Metrological Aspects of Pulsed Photoacoustic Spectroscopy to Measure Glucose Concentration

David A. Medina-Sanchez, Miguel A. J. Gonzalez-Martinez [S] and Gerardo Gutierrez-Juarez [C]
Departamento de Ingenieia Fisica, Division de Ciencias e Ingenierias, Universidad de Guanajuato, Leon, Guanajuato, México

Raquel Huerta-Franco
Departamento de Ciencias Aplicadas al Trabajo, Division de Ciencias de la Salud, Campus Leon, Universidad de Guanajuato, Leon, Guanajuato, México

Noninvasive detection, more exactly not painful, of glucose is one of the most active areas in biomedical research. Several noninvasive monitoring techniques have been developed in recent years, but so far not one has been established definitively. In this work the metrological aspects, related to the sensitivity and resolution, of the pulsed photoacoustic spectroscopy signal for the measurement of glucose concentrations were experimentally investigated. Different concentrations of glucose, in the physiological range (10 to 450 mg/dL), were diluted in 1 % Lipofundin^{TM} and used them as glucose tissue phantoms. It is shown that pulsed photoacoustic spectroscopy has high resolution because it is possible to detect changes in glucose concentration around of 10 mg/dL. With this technique we could detect very low glucose concentration (10 mg/dL), and demonstrate the high sensitivity of this method.