

Noninvasive Continuous Glucose Monitoring Device Using a Photon-Assisted Tunneling Photodetector Based on a Quantum Metal-Oxide-Semiconductor

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Abstract : Continuous glucose monitoring systems are essential for diabetics to avoid health complications but come at a costly price, especially when insurance does not fully cover the diabetic testing kits needed. This paper proposes a noninvasive continuous glucose monitoring system to provide an accessible, low-cost, and painless alternative method of accurate glucose measurements to help improve quality of life. Using a light source with a wavelength of 850nm illuminates the fingertip for the photodetector to detect the transmitted light. Utilizing SeeDevice's photon-assisted tunneling photodetector (PAT-PD)-based QMOS™ sensor, fluctuations of voltage based on photon absorption in blood cells are comparable to traditional glucose measurements. The performance of the proposed method was validated using 4 test participants' transmitted voltage readings compared with measurements obtained from the Accu-Chek glucometer. The proposed method was able to successfully measure concentrations from linear regression calculations.

Keywords : continuous glucose monitoring, non-invasive continuous glucose monitoring, NIR, photon-assisted tunneling photodetector, QMOS™, wearable device

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