Managing diabetes with 3D nanostructured

Researchers have synthesized a sensitive nanosensor that can monitor the blood glucose levels though glycated hemoglobin (HbA1c) detection.

HbA_{1c} monitoring is very useful for patients suffering from Diabetes which provide patients to plan for their quantity and duration of their medicines to control Diabetes. Timely and easily detection of glucose can help them to overcome taking these irregular doses and timings. HbA1c is a typical glycosylated protein in the body, and its abundance represents the average blood glucose level over 2 to 3 months, corresponding to the 100 to 120 day lifespan of RBC. The HbA1c level can not only be used by diabetes patients to monitor their long-term glucose management in a way that is not affected by ?uctuations of the blood-glucose level, but also can be used by hospital to assess potential risks of diabetes complications of patients.

3D-structured reduced graphene oxide (rGO), multiwalled carbon nanotubes (MWCNT) and platinum nanoparticles(PtNPs) composite (PtNPs/rGO–MWCNT) were synthesized and used as interface for the development of an electrochemical HbA1c biosensor. A novel ultrasensitive electrochemical biosensor was fabricated and characterized for the selective detection of HbA1c using fructosyl amino oxidase (FAO) enzyme. The application is toward determination of HbA1c in whole blood samples. The study can provide a promising platform for fabricating nanohybrid biosensor.

Considering the reliability, stability and performance of this HbA1c biosensor, it can be concluded that FAO/PtNPs/rGO–MWCNT/Au electrode has a promising future in clinical diagnosis.

The sensor showed optimum response within 3 seconds. This biosensor can be used 50 times over a period of 12 weeks. "It can also be used for point-of-care application and can be integrated with the current glucose meter for diabetic," says lead researcher Dr. Nidhi Chauhan from Amity University, Noida, India.

Utkarsh Jain, Nidhi Chauhan
Amity Institute of Nanotechnology (AINT)
Amity University, Noida, India

Publication

Detection of glycated hemoglobin with voltammetric sensing amplified by 3D-structured nanocomposites.
Jain U, Gupta S, Chauhan N
Int J Biol Macromol. 2017 Aug