

Fibre optic biosensors based on glucose oxidase (GOX) immobilised onto a sol-gel-derived thin film

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In this paper an overview is presented of the state-of-the art of fibre optic biosensors which employ sol-gel-derived thin films. The technique is particularly suited to the side-coating of optical fibers or waveguides in evanescent-wave sensors because precise control of sensitivity-determining parameters, such as thin film thickness and length is obtainable. The sol-gel technology can be extended to the encapsulation of biological recognizing elements (proteins, enzymes, antibodies, whole cells, and other biomolecules). It is now well established that sol-gel immobilised biomolecules retain their structural integrity and full biological functions and are often significantly stabilized to chemical and thermal inactivation. Fibre optic biosensors based on glucose oxidase (GO_x) [derived GO_x] immobilised onto a sol-gel-synthesized thin film are reported. In particular, the development of a reversible glucose fibre optic biosensor based on three different configurations: sandwich, in which GO_x was placed between a sol-gel layer doped with Ru (dpp) and a second layer of pure sol-gel; two-layer, consisting of a sol-gel film doped with Ru (dpp) covered with sol-gel entrapped GO_x; powder, for which GO_x plus Ru (dpp)-doped sol-gel powder were dispersed in a sol-gel phase, is described. The review finishes with a highlight of issues which require further investigation.

Biography

Semanu K. Tsei is a Chemical Engineer and a graduate of Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. He is pursuing **M.Phil. /D.Phil. in Electrical and Electronic Engineering Science** at the University of Johannesburg, South Africa. His research interest is in the niche area of fibre optic chemical sensors and biosensors based on sol-gel-derived thin films with applications in; bioprocess, biomedical, and bioremediation engineering. He is a member of the following professional bodies: American Institute of Chemical Engineers (AIChE), IChemE, International Sol-Gel Society (ISGS), Japan Society of Chemical Engineers (JSCE), and Society of Biological Engineering (SBE). Semanu's research work focuses on developing sol-gel-based fibre optic biosensors with longer (extensively improved) shelf lives and applicable in wider ranges of pH and temperature conditions. He is exploiting the synergy between Photonics and Nano-biotechnology to achieve his research goals. Additionally, his research work would resuscitate fibre optic biosensing in Photonics Research Group, at the University of Johannesburg, South Africa.

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