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The potential application of functionalized ZnO nanorod as electrochemical (Glucose and metal ions) biosensors for intracellular environment

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The nanostructure of zinc oxide (ZnO) such as nanorods and nanowires has interesting nanosurfaces in addition to its bulk properties. ZnO has attracted much interest because of its unique piezoelectric, semiconducting, catalytic properties and being biosafe and biocompatible morphology combined with the easiness of growth. This implies that ZnO has a wide range of applications in optoelectronics, sensors, transducers, energy conversion and medical sciences. This abstract relates specifically to electrochemical biosensors based on single and multiple ZnO nanorods especially on a flexible substrate for the extra/intracellular environment. Functionalized zinc oxide nanostructure was used in biological, biochemical and chemical applications. One of the properties is that these nanostructures are very suitable for intracellular measurements of pH, metal ions, glucose and also for cholesterol using potentiometric measurements techniques. To adjust the sensor for intracellular measurements, the ZnO nanorods were grown on the tip of a borosilicate glass capillary (0.7µm in diameter) and functionalized with polymeric membrane or enzymes for intracellular selective metal ion sensors. The sensor in this study was used to detect and monitor real changes of metal ions and glucose across human fat cells and frog cells using changes in the electrochemical potential at the interface in the intracellular microenvironment. The fabrication of such type of device aims to explain the methodology of ions sensing using functionalized ZnO nanorods for the intracellular environment. This nanoelectrode device paves the way to enable analytical measurements in single living cells

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