

# **An Amperometric Glucose Biosensor Based on Nanopillar Array Electrodes**

Venkataramani Anandan, Yeswanth L Rao and Guigen Zhang  
Micro/Nano Bioengineering Lab, Department of Biological and Agricultural Engineering  
The University of Georgia

## **Abstract**

We used vertically aligned gold nanopillar arrays as sensing electrodes and measured their amperometric performance in the detection of glucose. The surface of the gold nanopillar array electrodes was modified via the immobilization of glucose oxidase through covalent bonding to a precoated self-assembled monolayer. Cyclic voltammetry and amperometry were performed to characterize the electrochemical processes of such a nanoelectrode-glucose system. A sensitivity of  $2.6\mu\text{A}/\text{mM}/\text{cm}^2$  was achieved with the nanopillar array electrodes, which is about 29 times higher than that of a flat gold electrode. This result clearly demonstrates that the nanopillar array electrodes have significant advantage in producing enhanced sensitivity, thus indicating that they can serve as an attractive platform for the development of next generation amperometric biosensors.