A DNA Biosensor Based Interface States of a Metal-Insulator-Semiconductor Diode for Biotechnology Applications

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Abstract

We studied how a DNA sensor based on the interface states of a conventional metal-insulator-semiconductor diode can be prepared for biotechnology applications. For this purpose, the p-type silicon/metal diodes were prepared using SiO2 and DNA layers. The obtained results were analyzed and compared with interfaces of DNA and SiO2. It is seen that the ideality factor (1.82) of the Al/p-Si/SiO2/DNA/Ag diode is lower than that (3.31) of the Al/p-Si/SiO2/Ag diode. This indicates that the electronic performance of DNA/Si junction was better than that of SiO2/Si junction. The interface states of the Al/p-Si/SiO2/DNA/Ag and Al/p-Si/SiO2/Ag junctions were analyzed by conductance technique. The obtained D-it values indicate that the DNA layer is an effective parameter to control the interface states of the conventional Si based on metal/semiconductor contacts. Results exhibited that DNA based metal-insulator-semiconductor diode could be used as DNA sensor for biotechnology applications.

Keywords

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