High selective spectroelectrochemical biosensor for HCV-RNA detection based on a specific peptide nucleic acid

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Abstract:

Hepatitis C virus (HCV) is a blood-borne virus that causes infectious chronic hepatitis. Egypt has the largest epidemic of HCV in the world, with about 14.7% of the Egyptian population. Thus, HCV, which could cause severe risks for human health including liver failure, becomes a public health concern for Egyptians. Development of highly selective and sensitive biosensors for accurate detection of HCV levels without extensive sample preparation has received great attention. The present work reported on developing a new rapid, highly selective and highly selective HCV-based biosensor for early detection of HCV-RNA extracted from clinical samples. The HCV-based biosensor was constructed by fabrication of gold nanodots/indium tin oxide substrate and followed by immobilization of a specific peptide nucleic acid (as bio-receptors) terminated with thiol group onto gold nanodots/indium tin oxide. The principle of the developed biosensor was based on the selective hybridization between the peptide nucleic acid and the HCV-RNA at the untranslated regions (5′-UTR). Raman spectroscopy and Square wave voltammetry techniques were used to monitor the interaction between the HCV-RNA and the immobilized peptide nucleic acid. The reported HCV-biosensor demonstrated a high capability to detect HCV-RNA

Keywords:

HCV-RNA biosensor Peptide nucleic acid Raman spectroscopy Square wave voltammetry Gold nanodots

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