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Electrochemical immunosensors for detection of different type of viruses

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In recent years much attention in virology has been focused on developing of affordable and adequate methods for detection of whole viruses or their fragments. Immunosensors are a promising technique for detection of pathogens since antibodies are natural receptors meant for binding of antigens harmful for the organism. Thus the binding selectivity and efficiency are naturally high. Here, we report examples of successful developing of several type of immunosensors destined for the detection of *Plum pox virus* (PPV) and *Prunus necrotic ringspot* virus (PNRSV), which affected stone fruit trees causing significant economic losses, as well as for detection of Highly-Pathogenic Avian Influenza type H5N1 virus (HPAI) spreading among wild and domestic birds. The immunosensors were developed by the successive modification of gold as well as glassy carbon electrodes .The whole antibody or their fragments have been applied as the sensing elements. It has been already reported that natural antibody activity can be retained on a gold nanoparticle surfaces .The complex between virions and specific antibody adsorbing on a surface of an electrode forms an insulating layer. This phenomenon, which is a base of immunosensors presented, can be monitored by the electrochemical impedance spectroscopy (EIS) in the presence of $[Fe(CN)_6]^{3-/4-}$ as a redox marker. The proposed immunosensors were effective regarding the following parameters: good sensitivity towards PPV, PRNSV and HPAI fragments, good selectivity and very small volume (10 µl) of analyzed sample. The matrix from plant materials, as well from plasma has no influence on the immunosensors performance.Thus, they could be recommended for the direct electrochemical detection of these viruses in the natural samples.

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