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A novel electrochemical biosensor based on polyadenine modified aptamer for label-free and ultrasensitive detection of human breast cancer cells

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Abstract

Simple, rapid, sensitive, and specific detection of cancer cells plays a pivotal role in the diagnosis and prognosis of cancer. A sandwich electrochemical biosensor was developed based on polyadenine (polydA)-aptamer modified gold electrode (GE) and polydA-aptamer functionalized gold nanoparticles/graphene oxide (AuNPs/GO) hybrid for the label-free and selective detection of breast cancer cells (MCF-7) via a differential pulse voltammetry (DPV) technique. Due to the intrinsic affinity between multiple consecutive adenines of polydA sequences and gold, polydA modified aptamer instead of thiol terminated aptamer was immobilized on the surface of GE and AuNPs/GO. The label-free MCF-7 cells could be recognized by polydA-aptamer and self-assembled onto the surface of GE. The polydA-aptamer functionalized AuNPs/GO hybrid could further bind to MCF-7 cells to form a sandwich sensing

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