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Apta-nanosensors for detection and quantitative determination of acetamiprid – A pesticide residue in food and environment

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ABSTRACT

In an effort to achieve high sensitive and selective detection of pesticide residues, numerous nanomaterial-based aptasensors are currently being developed for acetamiprid analysis. Recently, aptamers as a potent alternative of antibodies are used in biosensing platforms. There is tremendous interest in utilizing of nanomaterial as basic building blocks and signaling elements in aptasensors. The nanomaterials have the unique optical and electrical properties. The combination of nanomaterial and aptamer technology has opened a new window in pesticide residues monitoring. In this review, recent advances and applications of optical and electrochemical nanomaterial-based aptasensors for the detection and quantitative determination of acetamiprid in details have been discussed.

Abbreviations

ABA, acetamiprid-binding aptamer; Au NRs, Au nanorods; CB, conduction band, CdTe; CL, chemiluminescence; CNTs, carbon nanotubes; CS, complementary strand; Cy5.5, Cyanine5.5; DPV, differential pulse voltammetry; dsDNA, double stranded DNA; EDC, ethyl(dimethylaminopropyl) carbodiimide; EIS, electrochemical impedance spectroscopy; Exo I, Exonuclease I; FRET, fluorescence resonance energy transfer; GNPs, gold nanoparticles; ITO, Indium tin oxide; LOD, limit of detection; RET, resonance energy transfer; R_{et}, electron transfer resistance; rGO, reduced graphene oxide; RLS, resonance light scattering; MB, methylene blue; MCH, 6-mer-capto-1-hexanol; MWCNTs, multi-walled carbonnanotubes; NHS, N-Hydroxysuccinimide; NPs, nanoparticles; PEC, photoelectrochemical; QDs, quantum dots; SiNP, silica nanoparticles; SPR, surface plasmon resonance; SWNTs, single-walled nanotubes; S-18