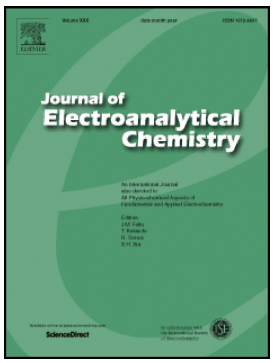

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Dual molecular recognition strategy for highly sensitive electrochemical detection of dopamine based on amplification of DNA–Au bio–bar codes

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Abstract:

We had reported an electrochemical assay for dopamine with high sensitivity and selectivity based on dual molecular recognition strategy and amplification of DNA–Au bio–bar codes. In this assay, carbon nanotubes was first immobilized on the glass carbon electrode surface. Subsequently, a boronic acid-functionalized pyrene probe was self-assembled on the sidewalls of carbon nanotubes via π−π stacking interactions as a capture probe. 3, 3′-dithiodipropionic acid di(N-hydroxysuccinimide ester) (DSP) and double strands DNA functionalized AuNPs (DSP/AuNPs/dsDNA) were designed as signal probes and characterized by transmission electron microscopy and spectroscopic techniques. Upon the binding of dopamine with boronic acid followed by DSP/AuNPs/dsDNA, the AuNPs were captured on the electrode surface to enhance the signal. RuHex, an electroactive complex, which could bind to the anionic phosphate of DNA strands through electrostatic interaction, serves as signaling transducer. Signal amplification and dual recognition were used to quantify dopamine concentration from 30 pM to 30 nM, with a detection limit of 18 pM. Other small molecules could be measured by this assay after modification with differential recognition molecules.

Keywords: electrochemical; dopamine; nanoparticles; DNA;

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