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Electrochemical Strategy for Pyrophosphatase Detection Based on the peroxidase-like activity of G-Quadruplex-Cu²⁺ DNAzyme

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Abstract

A new simple and highly sensitive electrochemical method for pyrophosphatase (PPase) activity detection was developed based on the peroxidase-like activity of G-quadruplex-Cu²⁺ DNAzyme. In the absence of PPase, Cu²⁺ could coordinate with pyrophosphate (PPi) to form Cu²⁺-PPi compound. While in the presence of PPase, it could destroy the coordinate compound because PPase catalyzed the hydrolysis of PPi into inorganic phosphate and produced free Cu²⁺, which then could be coupled with G-rich DNA to form G-quadruplex-Cu²⁺ DNAzyme. The formation of a mimic enzyme (G-quadruplex-Cu²⁺ DNAzyme) was immobilized on the surface of screen-printed gold electrode (SPGE). Using 3, 3', 5, 5'-tetramethylbenzidine (TMB) as a redox mediator and H₂O₂ as an enzyme substrate, the DNAzyme catalyzed the

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