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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-Cu^{2+} DNAzyme. In the absence of PPase, Cu^{2+} could coordinate with pyrophosphate (PPi) to form Cu^{2+}-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 Cu^{2+}, which then could be coupled with G-rich DNA to form G-quadruplex-Cu^{2+} DNAzyme. The formation of a mimic enzyme (G-quadruplex-Cu^{2+} DNAzyme) was immobilized on the surface of screen-printed gold electrode (SPGE). Using 3, 3′, 5, 5′-tetramethylbenzidine (TMB) as a redox mediator and H_2O_2 as an enzyme substrate, the DNAzyme catalyzed the