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Three-dimensional Tri-SNSs-layered electrodeposited reduced graphene oxide for ECL biosensing of DNA

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Abstract

In this study，we proposed a triangular silver nanosheets (Tri-SNSs)-layered, Chitosan (CS)-supported three-dimensional of reduced graphene oxide (3D-ERGO) electrochemiluminescence (ECL) biosensing platform using self-designed dual-Ru(bpy)$_3^{2+}$ scDNA (Ru_2-DNA) as capture probe for ECL biosensing of single-chain DNA (scDNA). Based on the different affinity with scDNA and double chain DNA (dcDNA), the biosensor is designed to recognize the target DNA (t-DNA), which leads to the desorption of a hybrid molecule from the surface of the biosensor, further removing the Ru_2-DNA and inhibiting the ECL. Analytical results clearly showed that the electrochemical and ECL behaviors of proposed biosensing platform on the glassy carbon electrode (GCE) exhibited outstanding performance, which was due to large specific surface area, high carrier mobility and strong π–π non-covalent attraction toward single-chain DNA (scDNA) of the stable 3D platform, and ECL amplification of Tri-SNSs. Besides, based on such a system, this strategy can effectively identify full match and mismatched target DNA (M-DNA) with a wide concentration range beyond 7 orders of magnitude and detection limit down to 16.2