**Triethanolamine Modified Gold Nanoparticles Synthesized by a One-Pot Method and Their Application in Electrochemiluminescent Immunoassy**

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Electrochemiluminescence (ECL) is a useful technique for qualitative and quantitative analysis of various samples in multiple applications, such as food safety, clinic test and environmental monitoring [1,2]. In many ECL systems, co-reactants play crucial roles in the redox-induced light emission process at the electrode surface [3,4]. In this work, a novel and environment-friendly nano-platform for ECL immunosensing enabled by triethanolamine (TEOA) modified gold nanoparticles (TEOA@AuNPs) is reported. The monodisperse TEOA@AuNPs are fabricated by one-pot synthesis using TEOA as both reducing and stabilizing agent in mild conditions. Then, the TEOA@AuNPs modified electrode not only acts as co-reactant for Ru(bpy)32+ ECL system, but also provides a carrier for antibody 1 to form label-free immunosensor through an interaction between antigen and antibody. The unique structure of the TEOA@AuNPs loads a large amount of co-reactant of Ru(bpy)32+, which shortens the electron transfer distance from the AuNPs surface to the appended TEOA molecules, thereby greatly enhances the ECL efficiency and amplified the ECL signal. In addition, Ru(bpy)32+-doped silica (RuSiO2) nanoparticles and antibody 2 were combined to form a composite for labels and a sandwich-type ECL immunosensor has been constructed. The possible mechanism of those ECL systems have also been proposed and confirmed by the EC-MS hyphenated technique. The cardiac troponin I (cTnI) was detected in a wide linear concentration range and the limit of detection (LOD) was 34 fg mL-1 or 5.5 fg mL-1 (**Fig. 1**) by using the proposed label-free or labeling ECL immunoassay method. Satisfactory results were obtained for real serum sample analysis. In brief, a nontoxic, inexpensive, and cost-effective co-reactants functionalized AuNPs, which might provide an alternative for traditional ECL analytical strategy.



**Fig. 1.** Calibration curves of decrease value of ECL intensity (Δ*I*) (A) by the label-free method and ECL intensity to logarithmic cTnI concentration (B) by the RuSiO2-labeling immunosensor.

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