High Sensitive Sandwich-type Electrochemical IgG Immunosensor Based on a Nanocomposite of Carbon Nanotube and Multifunctional Ionic Liquid Containing Aldehyde and Ferrocene Groups as Labels

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Using a nanocomposite of carbon nanotube and multifunctional ionic liquid as labels and chitosan as platform, we fabricated a sandwich-type electrochemical immunosensor. The multifunctional ionic liquid was anchored with both aldehyde groups and ferrocene groups. Aldehyde groups were used to bond the second antibody and ferrocene groups were used as signal probes. Due to the large surface area of carbon nanotube, increased-loading of ferrocene was obtained, which improved the sensitivity of the immunosensor. In addition, the high conductivity of carbon nanotube and ionic liquid also enhanced the sensitivity of the immunosensor. The fabricated immunosensor showed a good performance. The linear range was from 0.05 to 30 ng mL⁻¹ with a detection limit of 0.01 ng mL⁻¹ (S/N=3), which is 40 times higher than that of reported immunsensor for human IgG based on ferrocene as labels. We anticipate this strategy may provide a new platform for the clinic application.

Keywords: Multifunctional ionic liquid; Ferrocene; Carbon nanotube; Sandwich-type electrochemical immunosensor; Human IgG.

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