Sensitively Voltammetric Determination of Vanillin with a Molecularly Imprinted Ionic Liquid Polymer-Carboxyl Single-Walled Carbon Nanotubes Composite Electrode

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doi: 10.20964/2016.07.03

Received: 27 March 2016 / Accepted: 5 May 2016 / Published: 4 June 2016

A molecularly imprinted ionic liquid polymer-carboxyl single-walled carbon nanotubes composite coated glassy carbon electrode (MIP-SWNTs-COOH/GCE) was prepared. The MIP was synthesized by using vanillin (VA) as template, hydrophilic ionic liquid 1-(α -methylacrylate)-3-allylimidazolium bromide as functional monomer and ethyleneglycol dimethacrylate as crosslinker. The MIP was water-compatible and had porous structure and large surface. The ionic liquid and VA could interact through π - π and hydrogen bonds, thus the imprinted sites possessed good specific recognition ability. When it was loaded on SWNTs-COOH film, the resulting electrode exhibited highly selective and sensitive response to VA in aqueous solution. After optimizing the conditions, linear response ranges of 0.4-8 and 10-140 μ M with sensitivities of 178 μ A/ μ M cm² and 8.1 μ A/ μ M cm² were obtained. The electrode was successfully applied to the detection of VA in biscuit, soybean milk powder and vanilla tea, and the recoveries for standards added were 94–107%.

Keywords: Vanillin; Molecularly imprinted polymer; Single-walled carbon nanotubes; Ionic liquid polymer; Electrochemical sensor

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