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Electrodeposition of hydroxyapatite on nickel foam and further modification with conductive polyaniline for non-enzymatic glucose sensing

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ABSTRACT

A hybrid material of hydroxyapatite, nickel foam and polyaniline (PANI/HAP/NF) were assembled for non-enzymatic glucose sensing. First, we prepared rod-like hydroxyapatite (HAP) on the surface of nickel foam (NF) through cathode electrodeposition. The 3D network of NF enlarges the area of nickel, and the plentiful active sites on HAP surface are helpful to adsorb glucose molecules. Second, the surface of HAP/NF was modified by a self-assembled polyaniline (PANI) membrane to improve the ability of HAP to transform charges. The hybrid shows an excellent synergistic effect on non-enzymatic glucose sensing in alkaline electrolyte. The assembled PANI/HAP/NF sensing electrode presents a broad glucose concentration-dependent current linear range from 1 $\mu\text{mol dm}^{-3}$ to 30 mmol dm^{-3} . The sensitivity and detection limit reach 1704 $\mu\text{A mM}^{-1} \text{cm}^{-2}$ and 0.32 $\mu\text{mol dm}^{-3}$ ($S/N=3$), respectively. The response of current to glucose concentration is much more prominent than that of common interference compounds, such as L-ascorbic acid,

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