
Development of a lab-made screen-printed electrode with a PANi-DES/Au/Printex L6 interface for folic acid analysis in biological samples

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Folic acid (FA) is a vital vitamin (B9), and its accurate measurement is crucial for clinical diagnosis and nutritional monitoring [1], [2]. Traditional analytical methods can be complex, creating a demand for faster, more accessible technologies. This work introduces a highly sensitive, lab-made electrochemical sensor for rapid FA determination. The platform is based on a screen-printed electrode (SPE) innovatively modified with Printex L6 carbon and chitosan. To further boost performance, Au nanoparticles were electrodeposited on its surface, followed by the electropolymerization of polyaniline within a deep eutectic solvent (DES). This unique combination of materials resulted in a significantly amplified electrochemical signal for FA. Operating at an optimal pH of 7.0 in presence of Britton-Robinson buffer solution, the sensor demonstrated excellent performance with a wide linear range (1.15 to 40 $\mu\text{mol L}^{-1}$) and an impressively low limit of detection (0.018 $\mu\text{mol L}^{-1}$). The sensor was successfully validated in complex biological matrices, including saliva, blood serum and urine, achieving outstanding recovery rates (95.25%–103.80%) and high selectivity against common interferents. This cost-effective, reliable, and customizable platform presents a powerful new tool for routine analysis in healthcare and quality control.

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References:

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