Sustainable architecting of Co_2SnO_4/CE-BN-based electrochemical platform for highly selective and ultrasensitive detection of 2-nitroaniline in life samples

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Chellapandi Bhuvaneswari, Karuppaiya Palpandi, Natarajan Raman & Sundaram Ganesh Babu

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Abstract

A novel binary heterogeneous electrocatalyst, Co_2SnO_4, decorated on chemically exfoliated boron nitride sheets (CE-BN) with an exceptional capacity to detect electrochemical properties has been prepared by the simple hydrothermal method. The structural, surface morphology and electrochemical characteristics of Co_2SnO_4/CE-BN were characterized using a range of physicochemical and electrochemical techniques. Various voltammetric approaches were used to observe the analytical behaviour and applications of Co_2SnO_4/CE-BN/GCE for the determination of 2-nitroaniline (2-NA). The whole experiment is operated in the potential range from 0 to − 1.0 V *vs* Ag/AgCl (sat. KCl). The impact of operational factors on the peak current of 2-NA was investigated, including the pH, sample concentration, modifier amount and scan speed. With an estimated differential pulse voltammetry detection limit of 0.0371 µM and excellent sensitivity of 1,35 µA μM^{-1} cm^{-2}, the produced sensor, Co_2SnO_4/CE-BN/GCE, revealed high electrocatalytic activity (DPV). The system is more practical and sustainable due to its repeatability, stability and reproducibility with respect to the results achieved for detection of 2-NA. The synthesized Co_2SnO_4/CE-BN-modified sensor may thus be a likely choice for the detection of 2-NA in actual water sample analysis.

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Ethics declarations