Development of electrochemical sensor using bismuth deposited gold-nanowire modified carbon nanotube on screen printed electrode for determination of arsenic (III)

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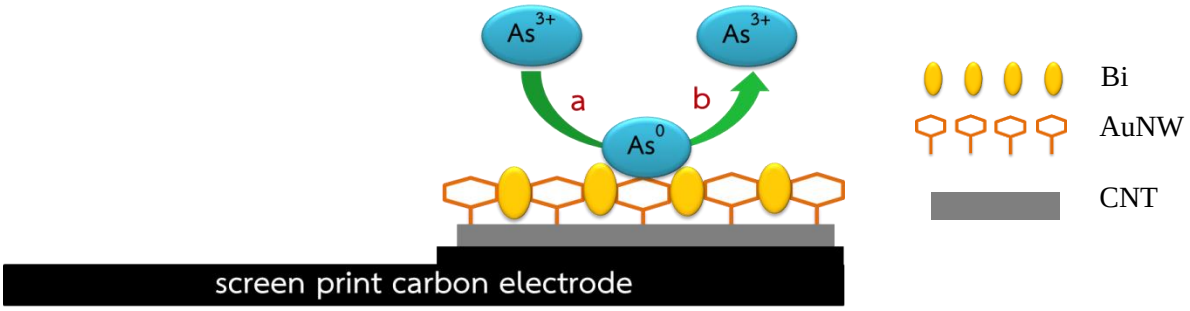
In this study, a chemical sensor for determination of arsenic (III) will be developed using carbon nanotube (CNT), gold nanowire (AuNW) and bismuth (Bi) on screen printed carbon electrode (SPCE) surface. Four types of bare SPCE; circle, square, square punctuate and ellipse were designed and tested by cyclic voltammetry in potassium hexacyanoferrate (III) solutions. The square design SPCE gave a highest signal and was selected for further experiment. The selected SPCE was modified with Bi/CNT-AuNW and tested in 1 ppm of As (III) using the square wave anodic stripping voltammetry. The analytical signal was observed at a peak potential of -0.15 V. Under the optimal condition, this sensor showed a high sensitivity (1.0 μA ppm^{-1}), low detection limit (2.5 ppb) and wide linearity range (10 ppb – 100 ppm). The modified electrochemical sensor was applied for detection of arsenic in rice sample and validated with inductively coupled plasma-mass spectrometry.



Keywords: Arsenic sensor, Carbon nanotube-gold nanowire-bismuth, Screen printed carbon electrode, Square wave anodic stripping voltammetry