

Electronic Supplementary Information (ESI)

Mechanical pencil lead-supported carbon nanotube/ Au nanodendrite structure as an electrochemical sensor for As (III) detection

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Evaluation of dynamic range of the sensor

The dynamic response range of the sensor was tested by observing responses of As³⁺ samples greater than 80 ppb and up to 800 ppb as presented in Fig. S1, showing the variation of As³⁺ peak intensities according to the elevation of As³⁺ concentration. The variation was clearly linear over the 0.5 - 800 ppb range with R² of 0.994; while, the response became nonlinear afterward. Therefore, the found dynamic range was 0.5 - 800 ppb.

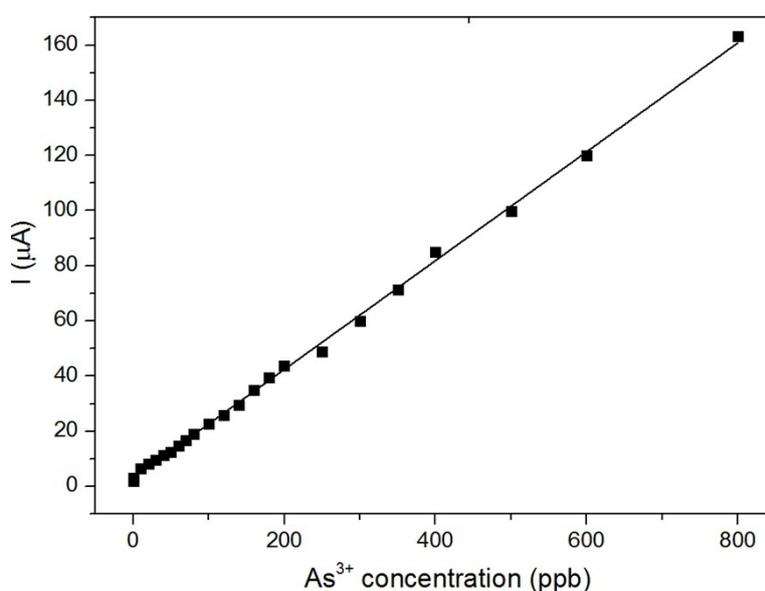


Figure S1. Variation of As³⁺ peak intensities according to the elevation of As³⁺ concentration from 0.5 to 800 ppb.

Selectivity test against As^{5+} , organic As and Hg^{2+}

Further, the selectivity of sensor against As^{5+} , organic As (monomethyl arsenic acid) and Hg^{2+} was separately tested. For the evaluation, the concentrations of each interfering component were separately varied from 0.5, 10, 30, 50, 70, 90, 110 to 130 ppb in 10 ppb As^{3+} samples and the resulting samples were measured. Fig. S2 (a), (b) and (c) shows DPV voltammograms of 10 ppb As^{3+} samples with the presence of As^{5+} , organic As and Hg^{2+} , respectively. No distinct electrochemical peaks corresponding to As^{5+} and monomethyl arsenic acid were observed except the only As^{3+} peaks around 0.05 V. In a meanwhile, Hg^{2+} peaks were observed around 0.38 V and the peak intensity increased with the elevation of Hg^{2+} concentration; however, the Hg^{2+} peak did not overlap with the As^{3+} peak. Fig. S2 (d) show the observed intensities of As^{3+} (black square) and Hg^{2+} (red circle) peaks. As shown, the intensities of Hg^{2+} peaks linearly increased with the concentration; while, the intensities of As^{3+} peaks did not significantly change under the variation of Hg^{2+} concentrations. Relative standard deviation (RSD) of the peak intensities was only 5% approximately. Based on the observations, the presence of As^{5+} , monomethyl arsenic acid and Hg^{2+} will not hamper the measurement of As^{3+} .

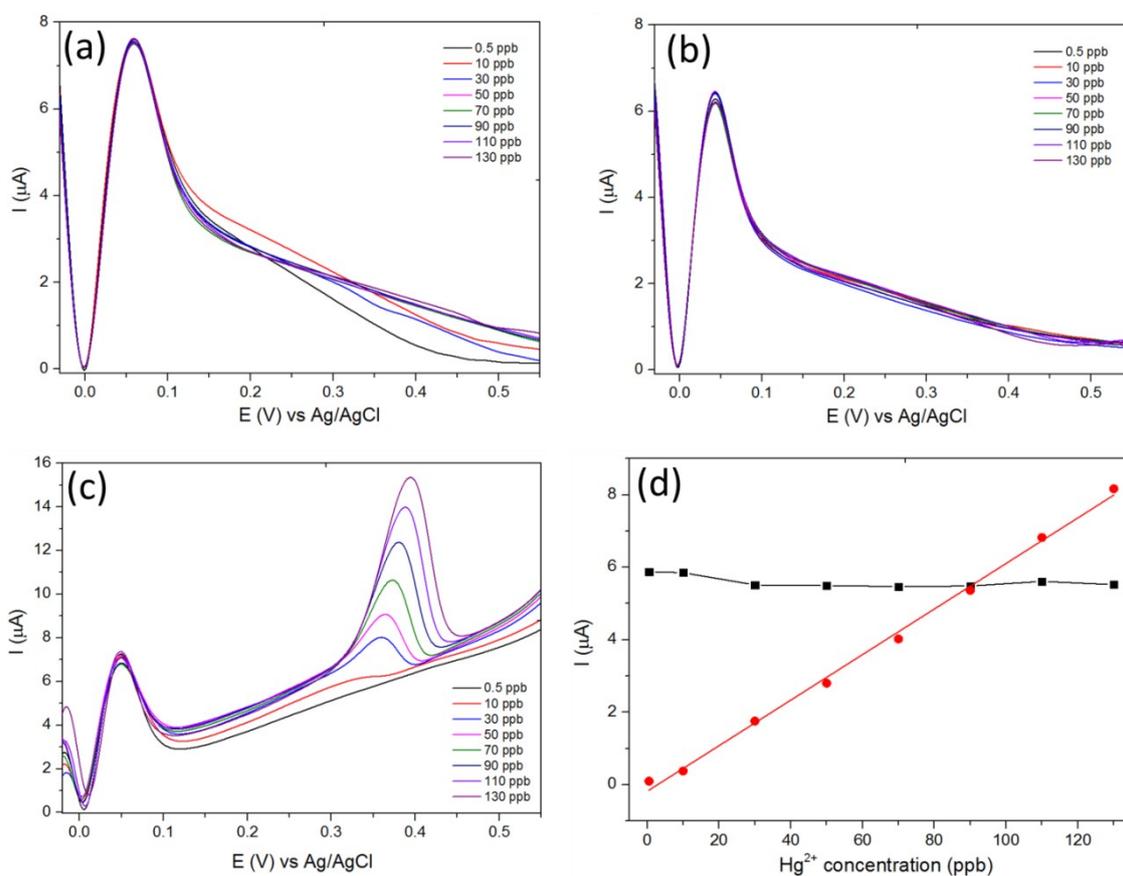


Figure S2. DPV signals of 10 ppb As^{3+} samples with the presence of As^{5+} (a), monomethyl arsenic acid (b) and Hg^{2+} (c). The concentrations of these interfering components varied from 0.5, 10, 30, 50, 70, 90, 110 to 130 ppb. The intensities of As^{3+} (black square) and Hg^{2+} peaks (red circle) are also plotted (d).