Supporting Information:

An electrochemical sensor based on Co_3O_4 nanosheets for lead ions determination

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Optimization for electrochemical detection of Pb(II)

Usually, pH value has a considerable effect on the electrochemical behavior of modified electrodes. The influence of pH on the electrochemical responses of the Co_3O_4/ITO elelctrode to Pb(II) is shown in Fig. S1.A. The pH in the range from 3.0 to 7.0 was tested because the modifier is leaked in under acidic conditions, while metal hydroxide complexes of $Pb(OH)_2$ and $Pb(OH)^+$ are formed when pH exceeds 5. The highest response is obtained at pH 5.0. Hence, pH 5.0 is selected as the optimum pH value for the electrochemical measurements of Pb(II) in the subsequent experiments.

Fig. S1.B demonstrates the effect of the Bi(III) concentration on the stripping response of Pb(II). The peak currents increased with the adding concentration of Bi(III) from 0 to 400 μg L^{-1}, the bismuth film deposited on the surface of the modified electrode was employed to facilitate the procedure of nucleation for metal ions and enhance the stripping peak currents due to its ability to form alloys with heavy metals[17,18]. However, the stripping peak currents decreased at the concentrations of Bi(III) exceeded 400 μg L^{-1}, indicating that an excess concentration of Bi(III) would be disadvantageous to the performance of the nanocomposite. Consequently, we chose 400 μg L^{-1} as the optimal Bi(III) concentration.

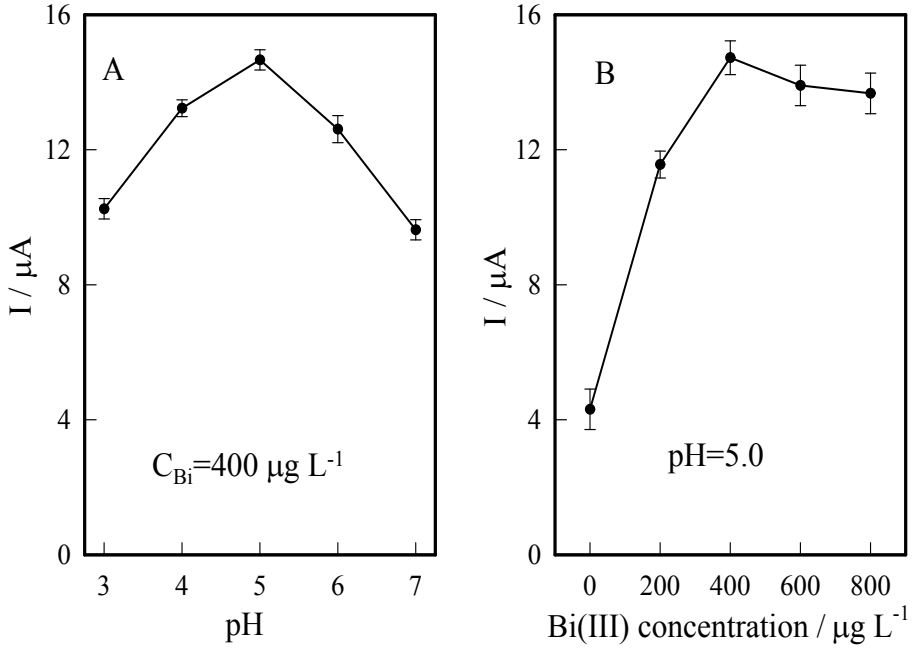

Fig. S1 The effect of pH (A) and Bi(III) concentration (B) on the stripping peak currents of 20 μg L^{-1} Pb(II) at the Co_3O_4/ITO electrode.

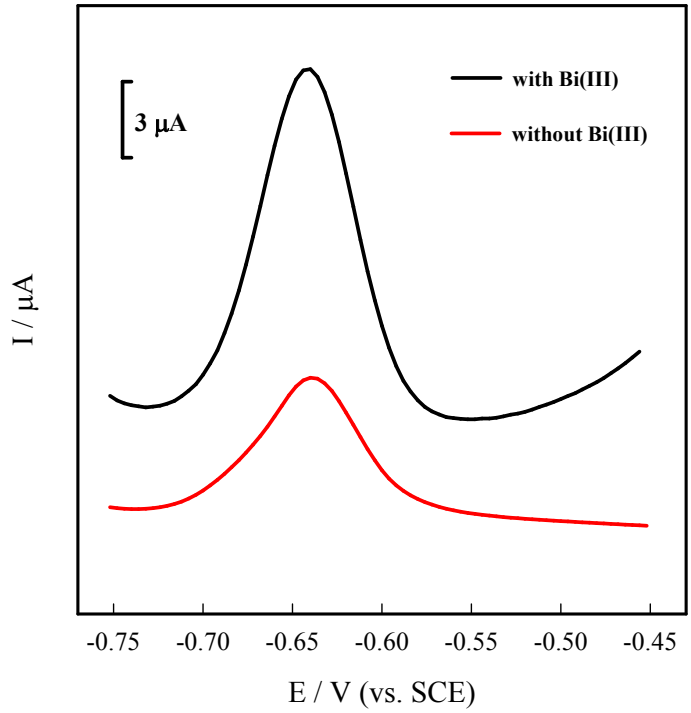

Fig. S2 DPASV of the Co_3O_4/ITO electrode for electroanalysis of Pb(II) with and without Bi(III) in 0.1 M NaAc-HAc buffer (pH 5.0) containing 20 μg L^{-1} Pb(II).

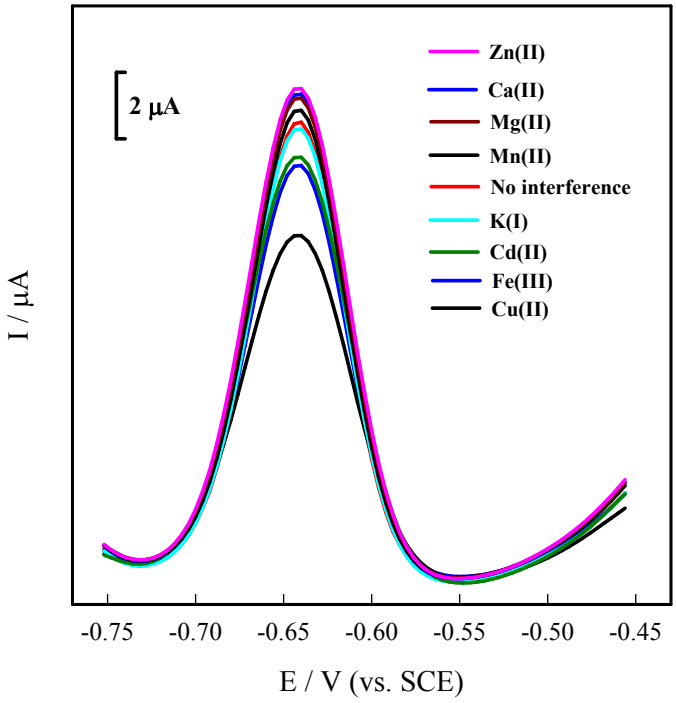

Fig. S3 Typical DPASV responses of the Co_3O_4/ITO electrode towards Pb(II) in presense of interferences.

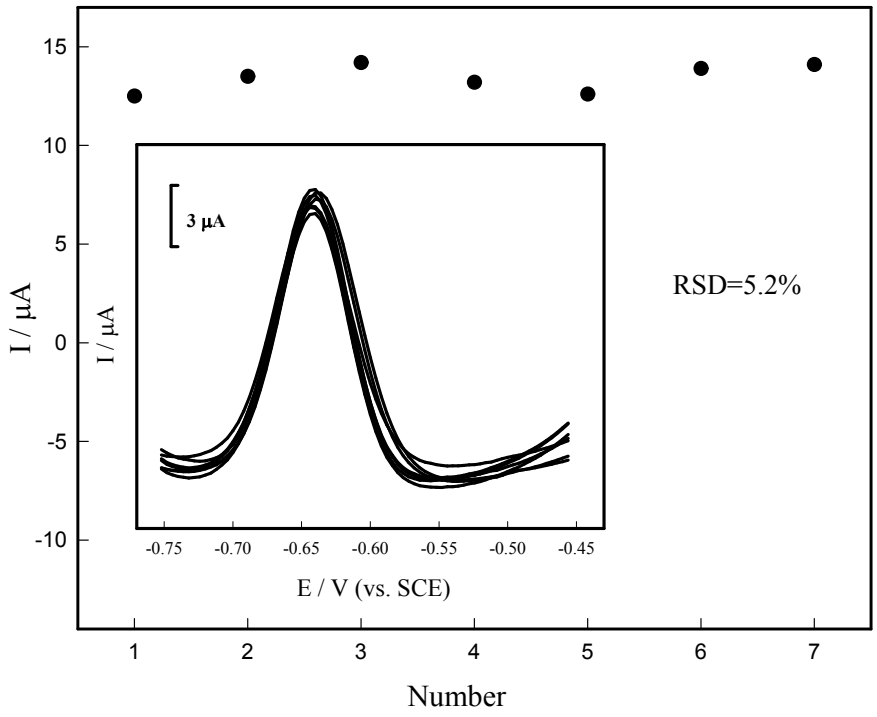

Fig. S4 Electrochemical responses of seven different Co_3O_4/ITO electrode in 0.1 M NaAc-HAc buffer (pH 5.0) containing 20 μg L^{-1} Pb(II) and 400 μg L^{-1} Bi(III). The insets corresponding to data collected from every DPASV response for seven electrodes. RSD referring to relative standard deviation.

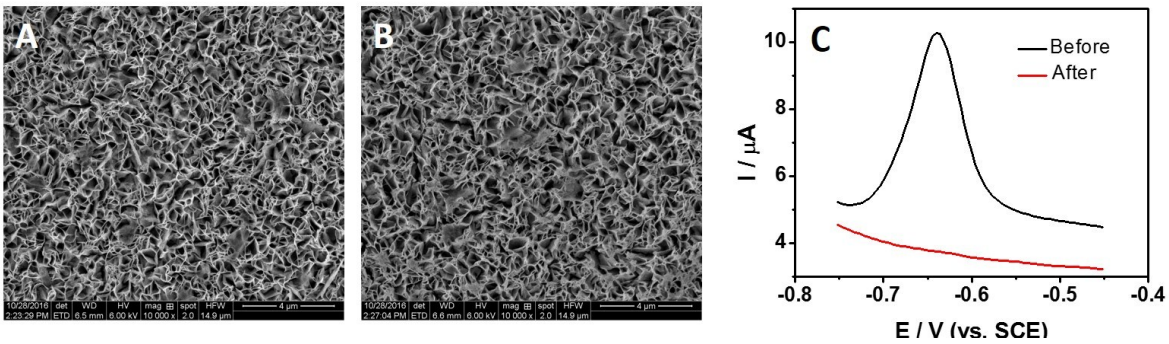

Fig. S5 SEM images of the Co_3O_4 nanosheets before (A) and after (B) the stripping of Pb, and typical DPASV responses of the Co_3O_4/ITO electrode before and after electrochemical stripping of Pb.

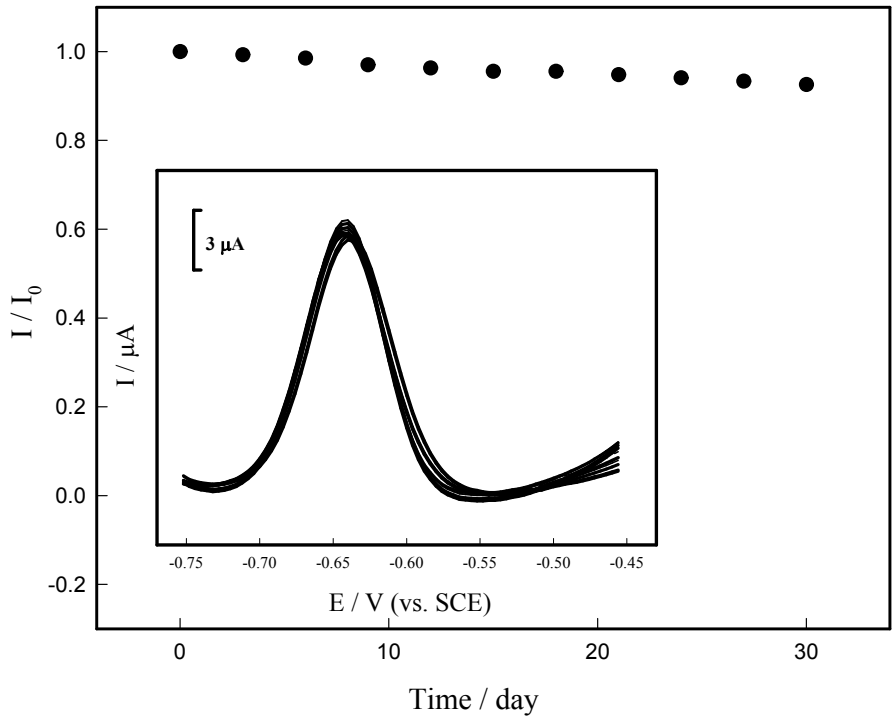

Fig. S6 Stability of the single Co_3O_4/ITO electrode stored at 4℃ for several weeks. The insets corresponding to data collected from DPASV response for the same Co_3O_4/ITO electrode.