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## (a) 15 $E_{p}(V) = 0.05 [pH] - 0.05$ 0.21 $R^2 = 0.99$ 10 0.18 5 Current /µA $E_p(V)$ 0.15 0.12 5 -5 6 7 (b) 0.09 8 -10 0.10 0.15 0.25 0.35 0.40 0.05 0.20 0.30 7 5 6 8 4 E/V vs SCE pН

Fig. S1 Dependence of CV peak potential of Arsenic (III)  $(0.5\mu M)$  at different pH range from 4 to 8 at IIP GCE electrode. Each error bar represents the standard deviation for n=3. The experimental parameters used are 20 ml of PBS of 0.2M as electrolyte and a scan rate of 0.05 mV/s.



Fig. S2 Optimization of experimental conditions (a) deposition potential (Deposition time: 180s (Stirring), Quiet time: 10s (not stirring)) (b) deposition time (Deposition potential: -0.5V, quiet time:10s (not stirring)) and (c) quiet time (Deposition potential: -0.2V, deposition time: 180s (stirring)) and a scan rate of 0.05V/s in 20 ml of PBS of 0.2M as electrolyte for sensitive detection of arsenic (III) by LSSV.

## **Supplementary File**



Figure S3 (a) Voltammogram showing the increase in arsenic peak current with the addition of arsenic (2.4 nM) from 0.3 nM to 4.5 nM to PBS (0.2M) pH 5 with a scan rate of 0.05V/s, deposition potential of -0.2 V, a deposition time of 180s and a quiet time of 15s and (b) corresponding linear calibration plot of peak current vs [arsenic (III)] by LSSV technique. Each error bar represents the SD for n=3.



Fig. S4 Optimization of experimental conditions (a) frequency (amplitude:0.15V, deposition potential: -0.2V, quiet time:2s (not stirring), deposition time:10s (Stirring)), (b) amplitude (frequency:15Hz, deposition potential: -0.2V, quiet time: 2s (not stirring), deposition time: 15s (Stirring)), (c) quiet time (frequency:100Hz, amplitude:0.15V, deposition potential: -0.2V, deposition time:15s (Stirring)) and (d) deposition time (frequency:100Hz,amplitude: 0.15V, deposition potential: -0.9V, quiet time:15s (not stirring)) for sensitive detection of arsenic (III) in 20 ml of PBS of 0.2M as electrolyte by SWASV.



Fig S5(a) Voltammogram depicting the increase in arsenic peak current with the addition of As(III) (2.4 nM) from 0.3 nM to 4.5 nM to PBS (0.2M) pH 5 and (b) corresponding linear plot of peak current against the concentration of arsenic (III) by SWASV technique. Each error bar represents the SD for n=3. Experimental parameters; amplitude: 0.15 V, frequency:100 Hz, deposition potential: -0.2 V, deposition time:180s, quiet time: 15s.



Fig. S6 Optimization of experimental conditions (a) deposition time (Deposition potential: -0.5V, Quiet time:10s (not stirring)) (b) quiet time (Deposition potential: -0.5V, Deposition time :180s (Stirring)) for sensitive detection of arsenic (III) in 20 ml of PBS of 0.2M as electrolyte by DPASV technique.



Fig. S7 (a) Voltammogram corresponding to the LSSV with the presence of interfering ions  $(Zn^{2+}, Pb^{2+}, Cu^{2+}, Ag^+ \text{ and } Fe^{2+}(20\mu L \text{ of } 1000 \text{ mg/L}))$  alone and interfering ions along with arsenic (III) (0.05 $\mu$ M) in 20 ml of PBS (pH 5) with a scan rate of 0.05V/s, deposition potential of -0.2, a deposition time of 180s and a quiet time of 15s. (b) A bar diagram showing the possible interference due to different organic compounds in the detection of As(III).



Fig. S8 Voltammograms obtained by LSSV show the real sample analysis for the quantification of As (III) in PBS (pH 5) with a scan rate of 0.05V/s, deposition potential of -0.2 V, a deposition time of 180s and a quiet time of 15s.



Fig. S9 Cyclic Voltammogram showing the stability of IIP GCE electrode in the absence of arsenic (III) in PBS (0.2M) (pH 7) for continuous 50 sweep segments with a scan rate of 0.05V/s in the potential range of -0.4V to 0.4V Vs SCE.