

Effects of Additives on Kinetics, Morphologies and Lead-Sensing Property of Electrodeposited Bismuth Films

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SUPPORTING INFORMATION

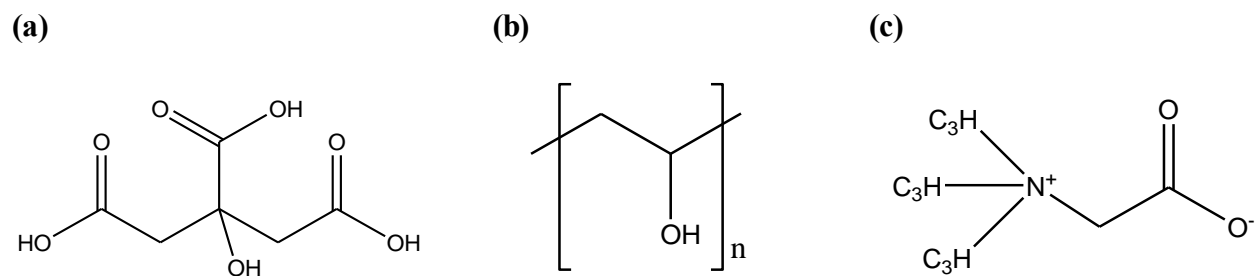
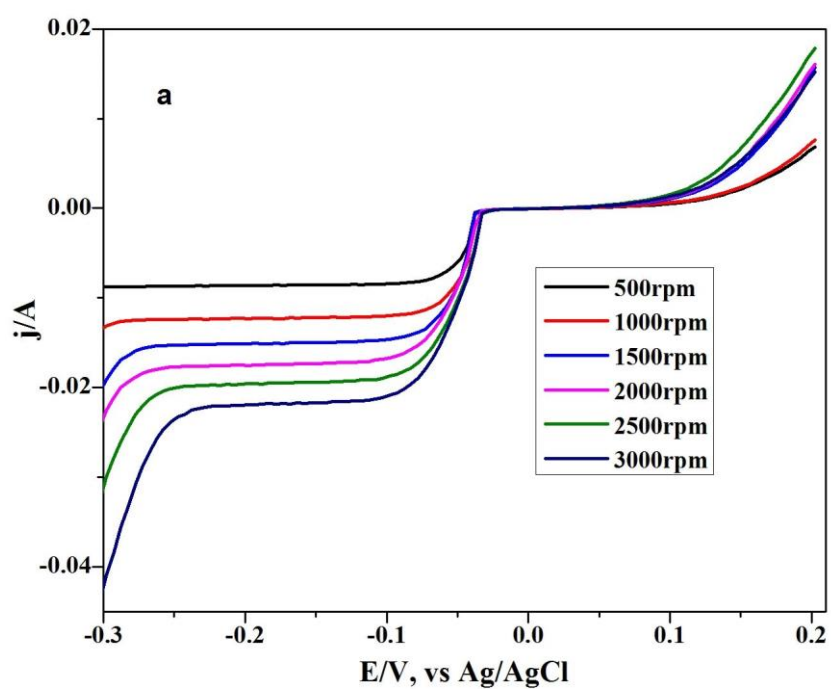


Figure S1. (a) Structure of Citric acid (b) Structure of Poly(vinyl alcohol) (c) Structure of Betaine



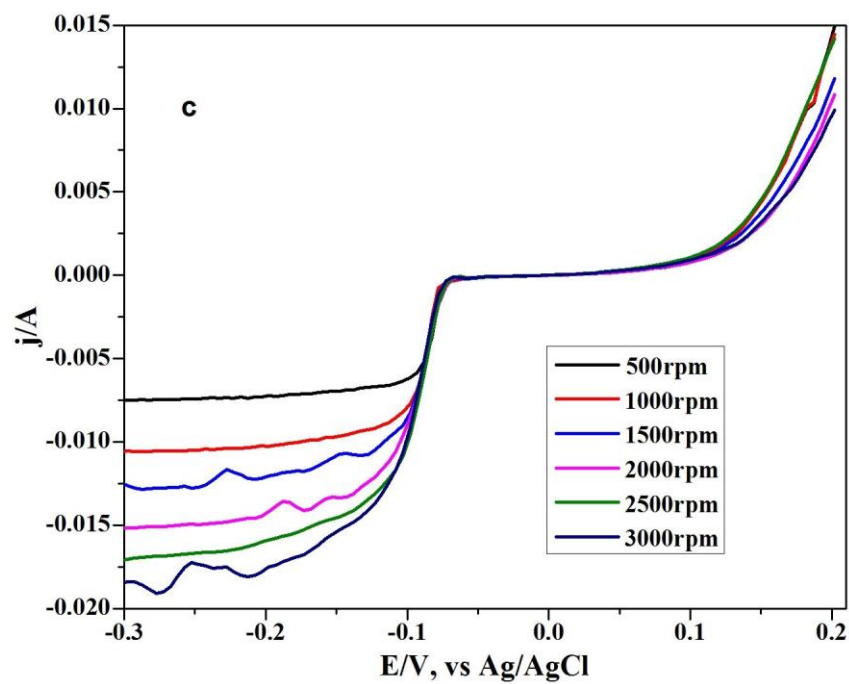
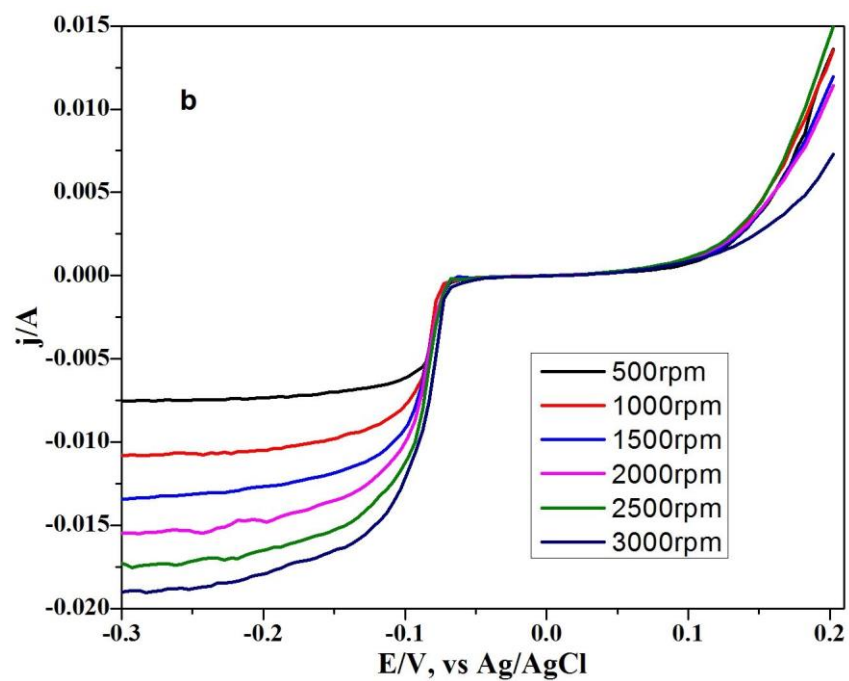
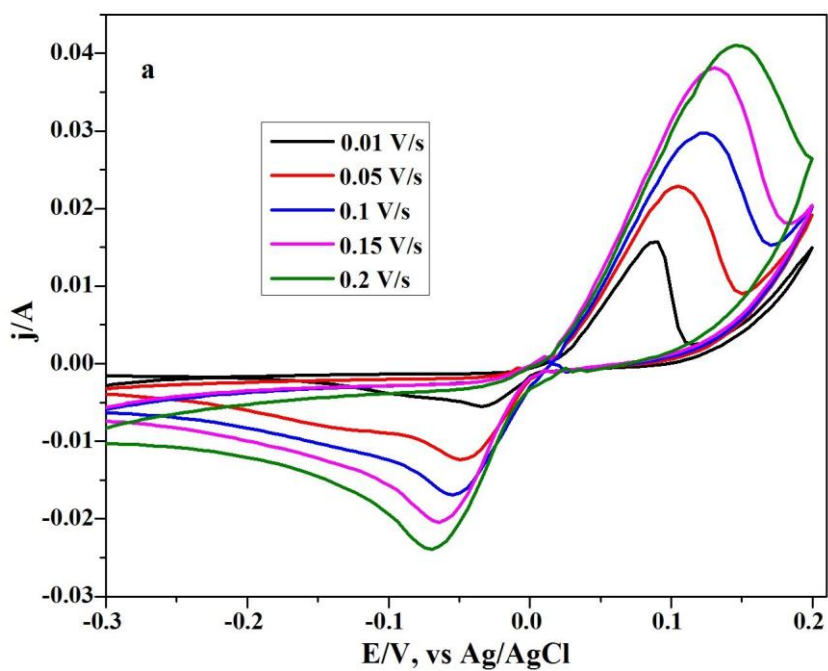
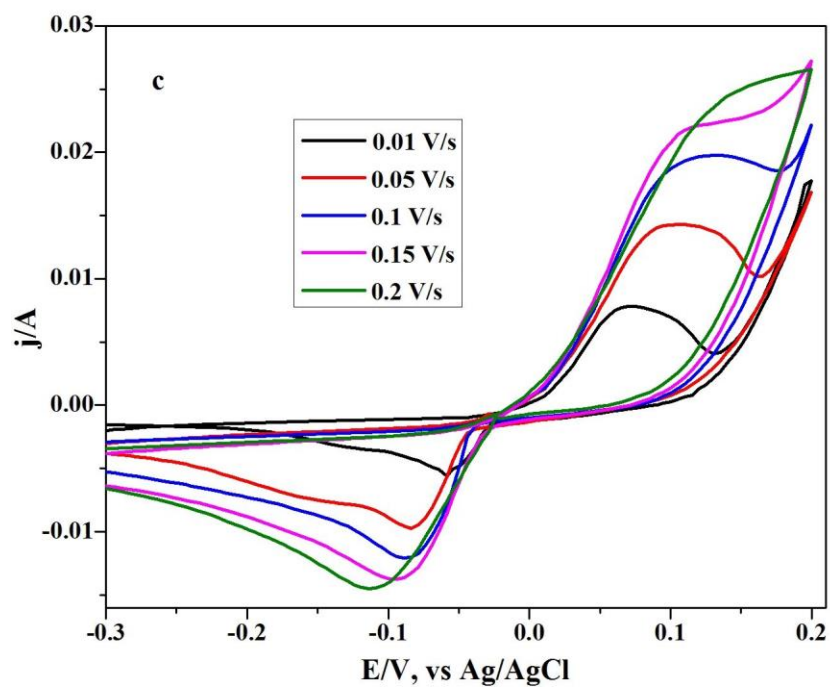
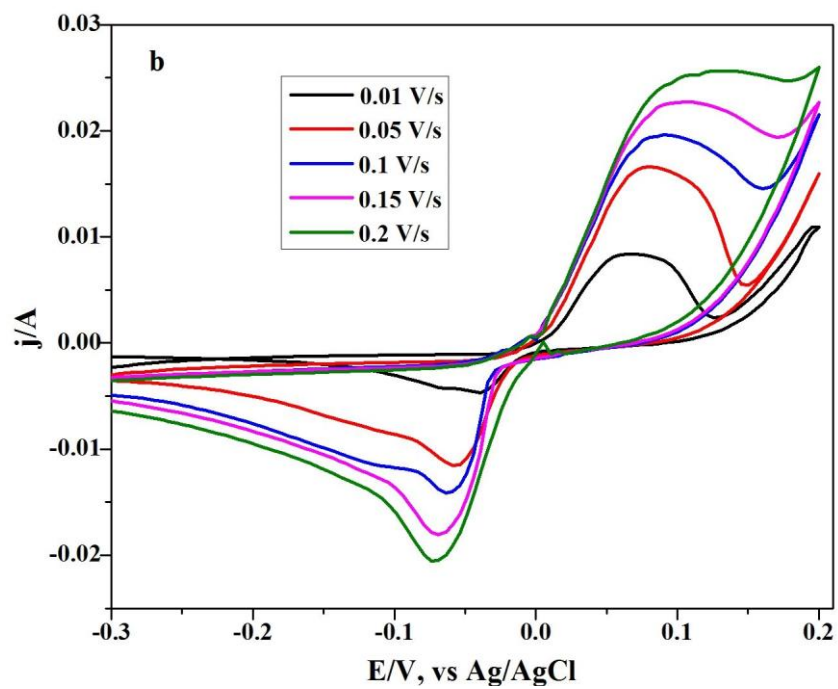


Figure S2. (a) Rotating disk voltammetry study of bismuth deposition from a bath containing 0.01 M $\text{Bi}(\text{NO}_3)_3$, 0.4 M HNO_3 , and 0.1M citric acid; **(b)** 0.01 M $\text{Bi}(\text{NO}_3)_3$, 0.4 M HNO_3 , 0.1M citric acid, and 5 gpl poly(vinyl alcohol); **(c)** 0.01 M $\text{Bi}(\text{NO}_3)_3$, 0.4 M HNO_3 , 0.1M citric acid, 5 gpl poly(vinyl alcohol), 0.01 M betaine.





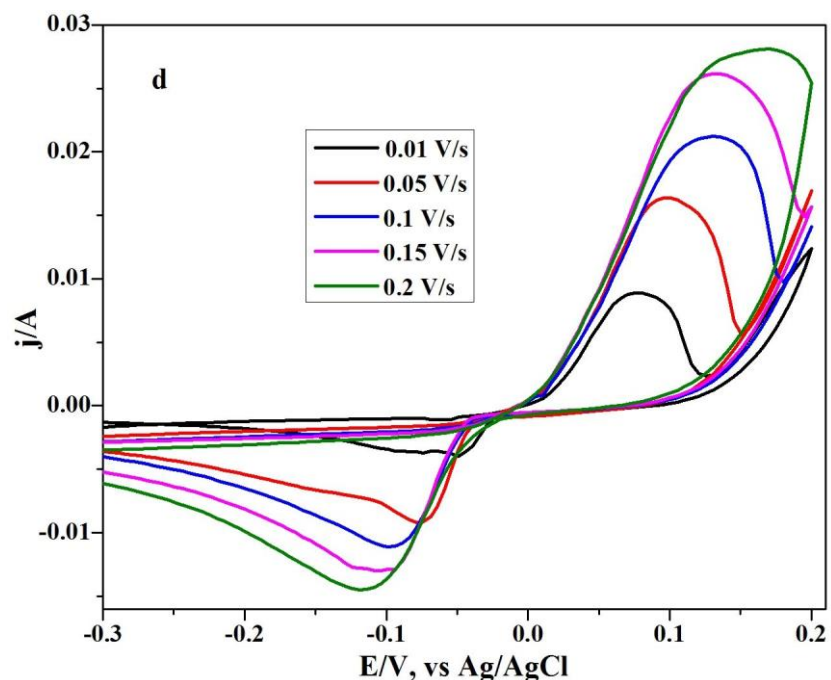


Figure S3. (a) Cyclic voltammetry of bismuth reduction in baths containing 0.01 M $\text{Bi}(\text{NO}_3)_3$ and 0.4 M HNO_3 at different scan rate (0.01, 0.05, 0.1, 0.15, 0.2 V); (b) with 0.1 M citric acid at different scan rate (0.01, 0.05, 0.1, 0.15, 0.2 V); (c) with 0.1 M citric acid and 5 gpl poly(vinyl alcohol) at different scan rate (0.01, 0.05, 0.1, 0.15, 0.2 V); (d) with 0.1 M citric acid, 5 gpl poly(vinyl alcohol) and 0.01 M betaine at different scan rate (0.01, 0.05, 0.1, 0.15, 0.2 V).

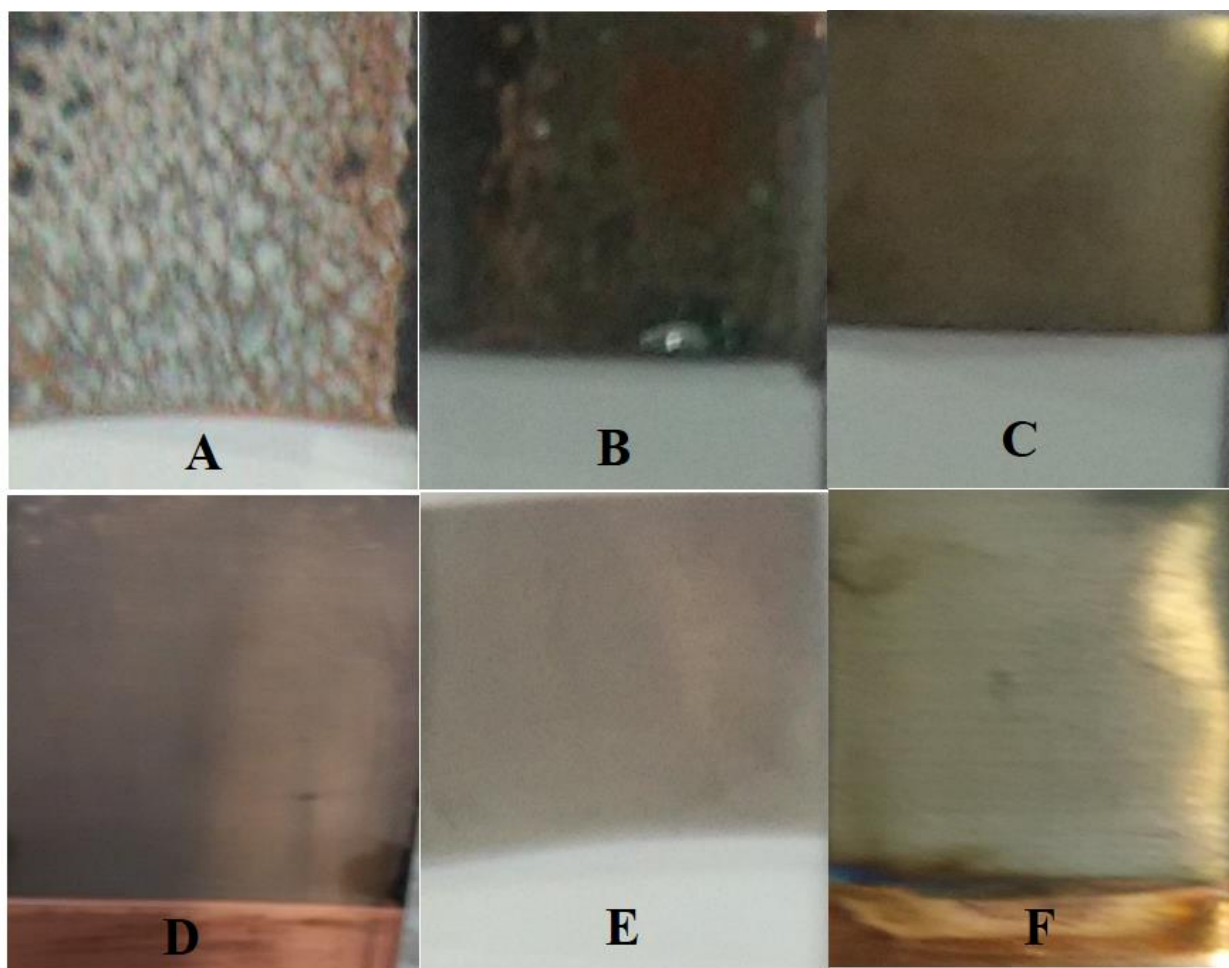


Figure S4. Electrodeposited samples table 1 (Samples A-F)

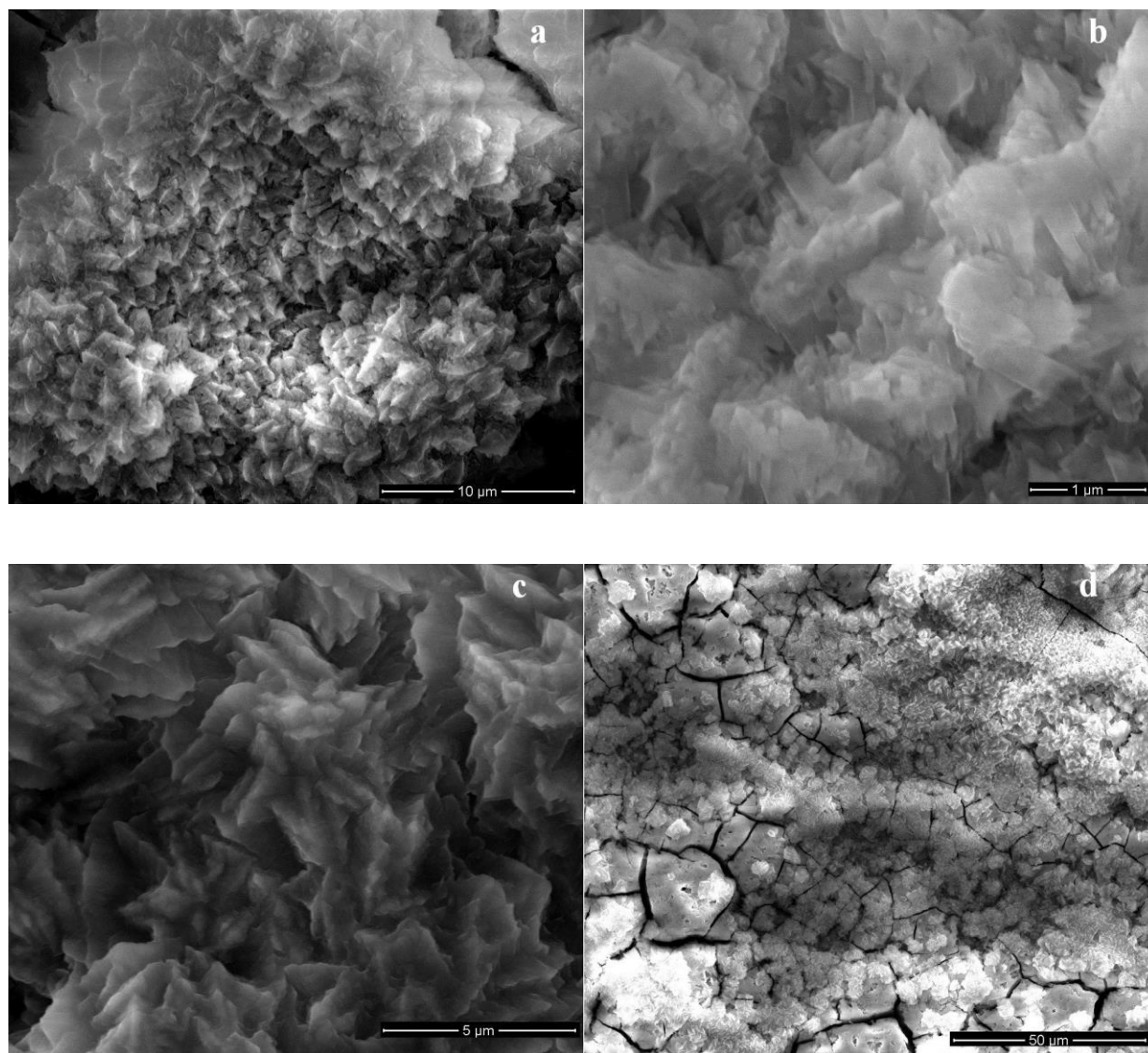
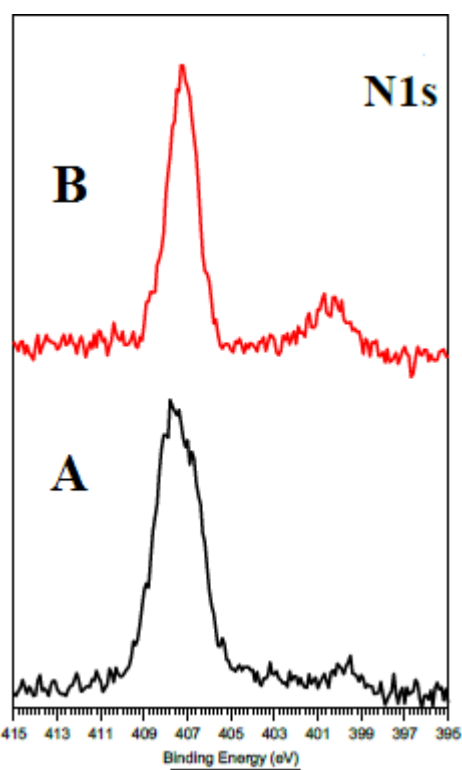
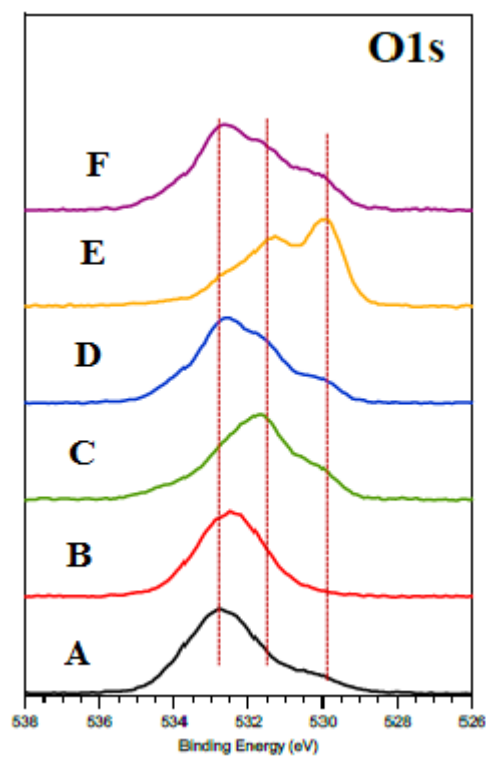
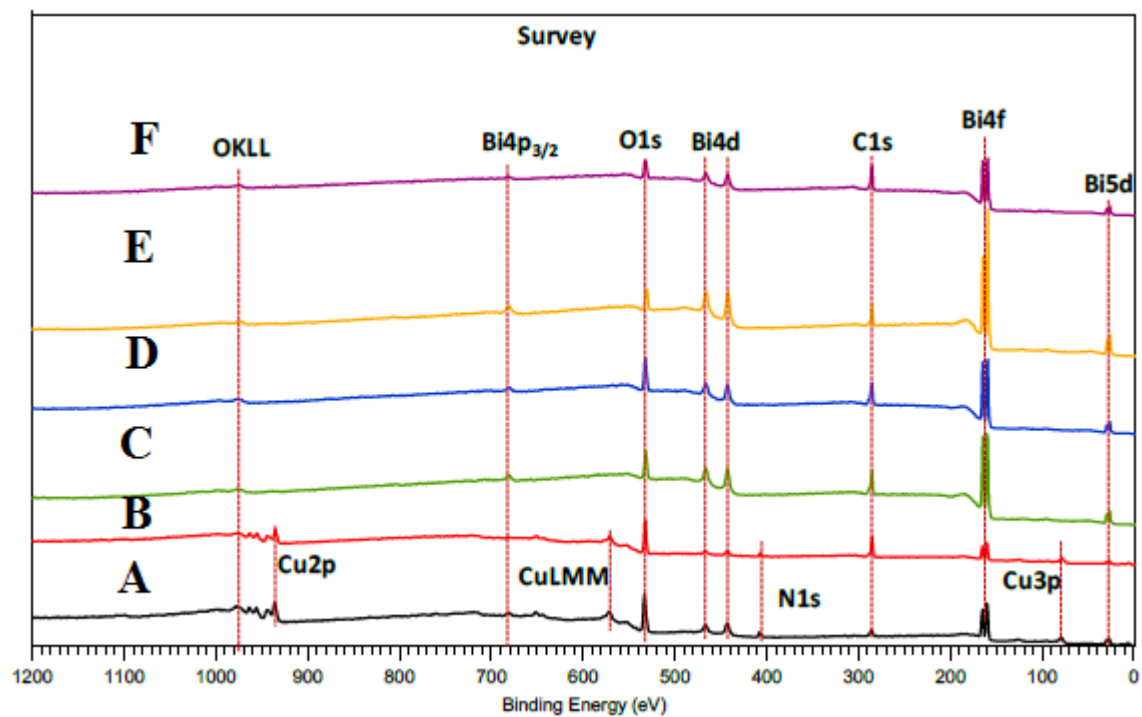


Figure S5. Electrodeposited bismuth with 0.1M citric acid (a&b) and 0.2 M citric acid (c&d) samples (Samples B)



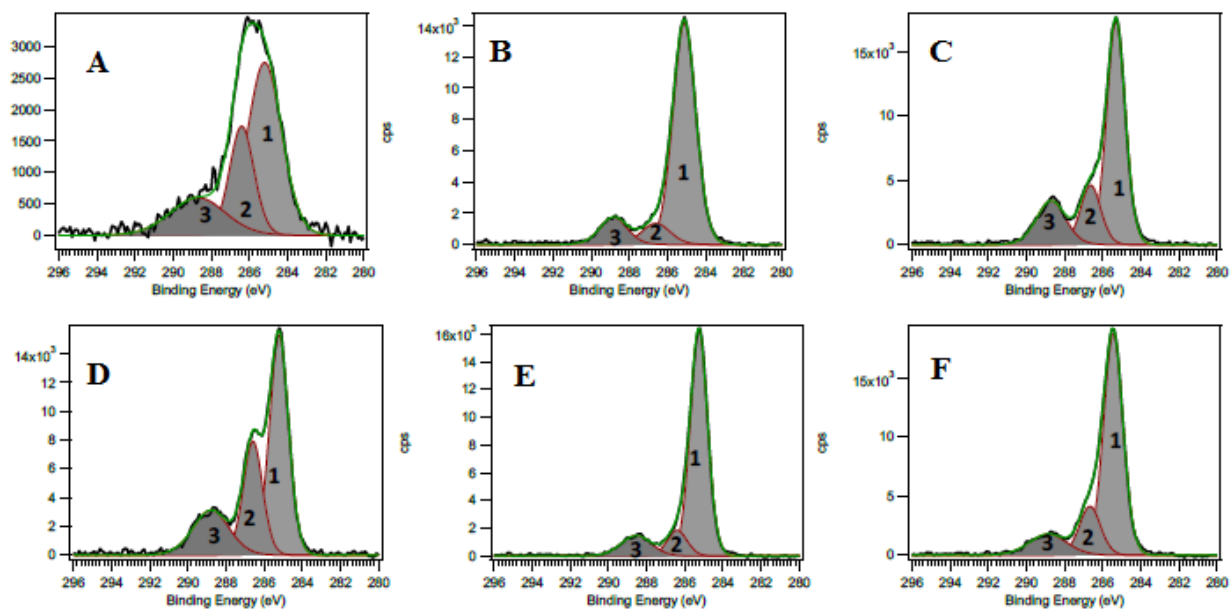


Figure S6. XPS spectra of electrodeposited bismuth in the absence/presence of additives (see **Table 1**). Survey scan, Oxygen, Nitrogen and carbon spectra respectively.