biosensors

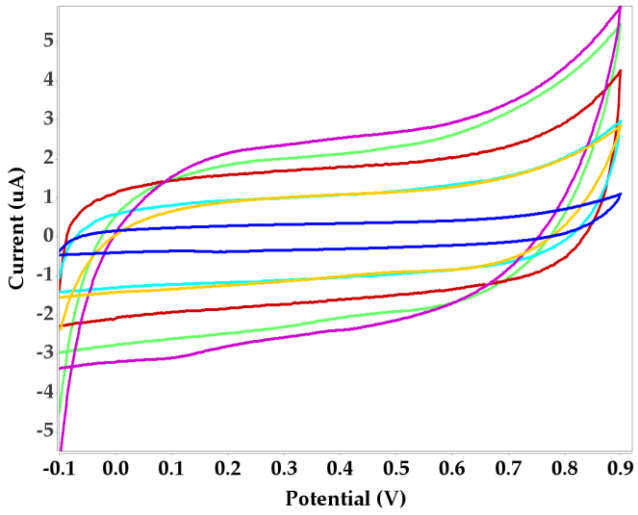
MDPI

Article

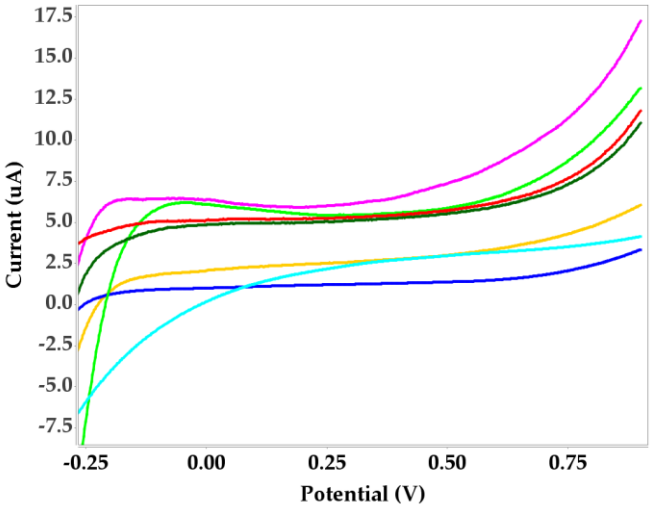
Development, Optimization, Characterization and Application of Electrochemical Biosensors for Detecting Nickel Ions in Food

Liliana Anchidin-Norocel [1], Wesley K. Savage [1,2,*], Gheorghe Gutt [3], Sonia Amariei [3]

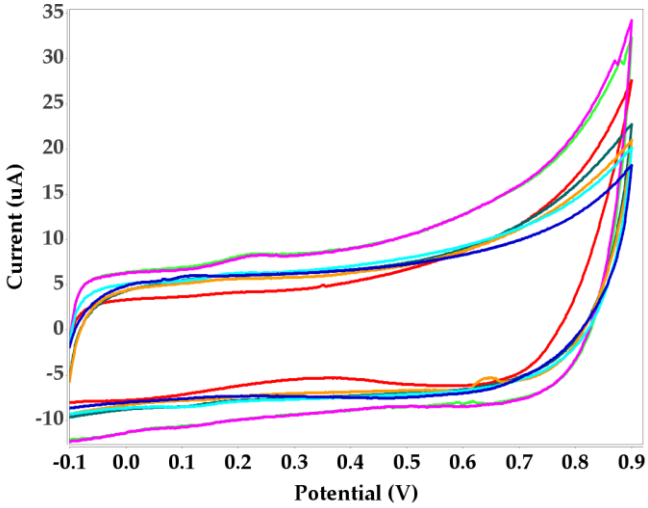
[1] Faculty of Medicine and Biological Sciences, Stefan cel Mare University of Suceava, 720229 Suceava, Romania
[2] Integrated Center for Research, Development and Innovation in Advanced Materials, Nanotechnologies, and Distributed Systems for Fabrication and Control, Stefan cel Mare University of Suceava, 720229 Suceava, Romania;
[3] Faculty of Food Engineering, Stefan cel Mare University of Suceava, 720229 Suceava, Romania
* Correspondence wesley.savage@usm.ro



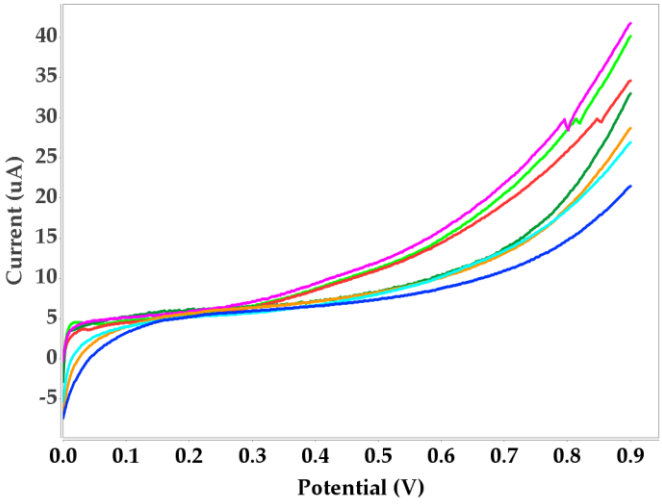
(**a**)



(**d**)



(**b**)



(**e**)

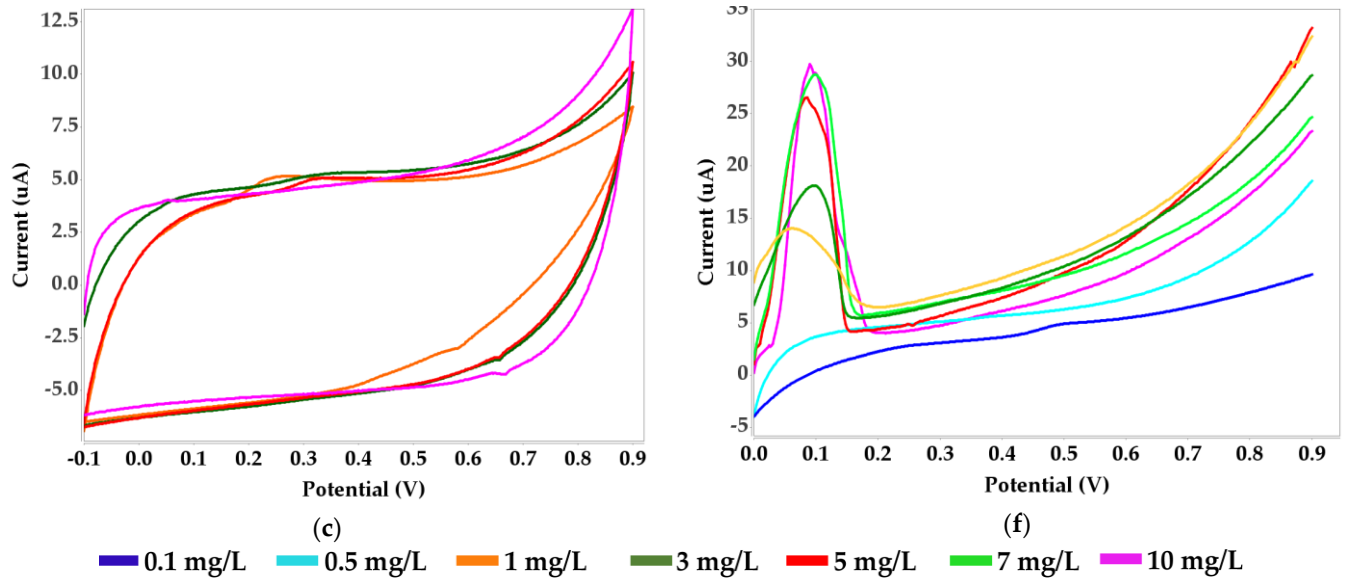
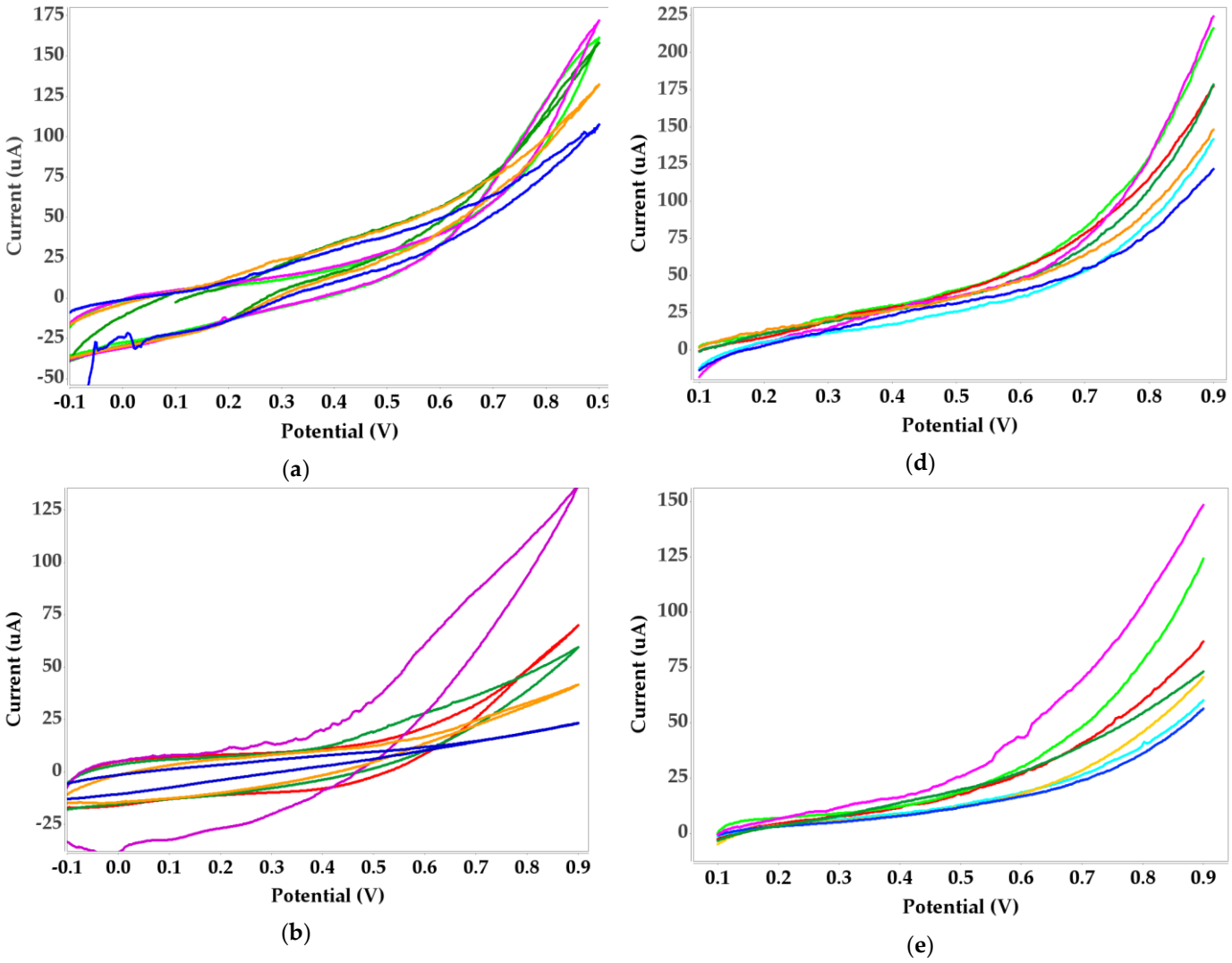


Figure S1. Voltammograms obtained for a nickel standard solution and Protein A-Agarose; Cyclic Voltammetry (CV) with Screen Printed Electrodes (SPEs) and (**a**) carbon, (**b**) bismuth, (**c**) silver; Linear Sweep Voltammetry (LSV) with SPEs and (**d**) carbon, (**e**) bismuth, (**f**) silver.



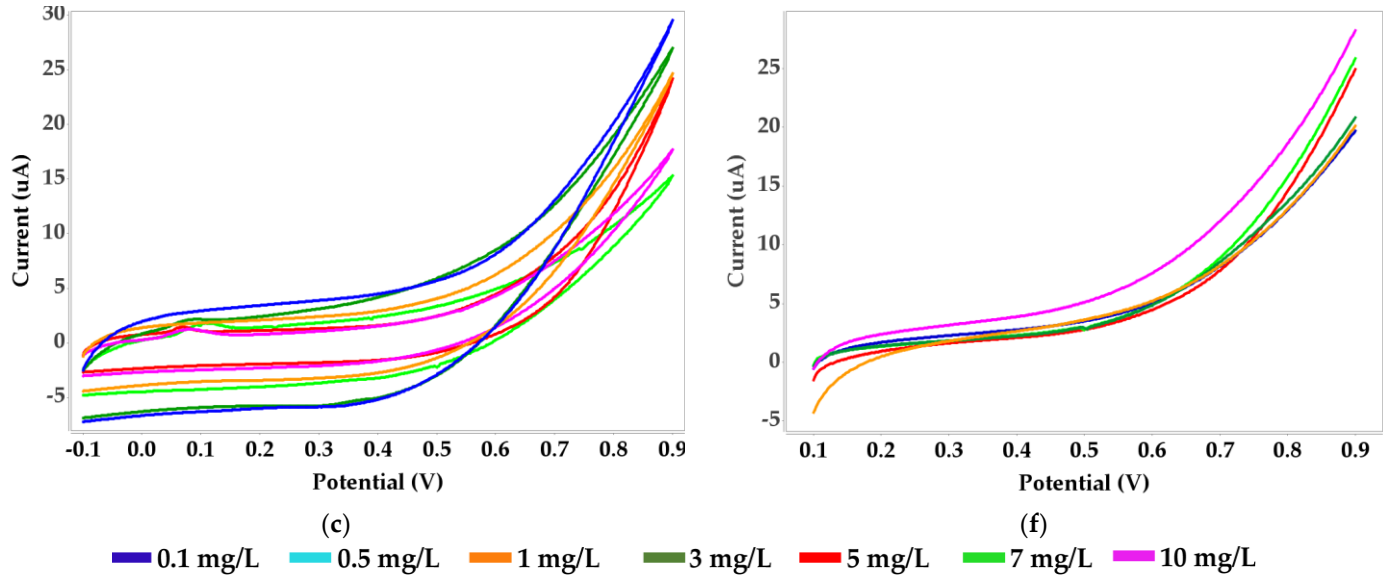
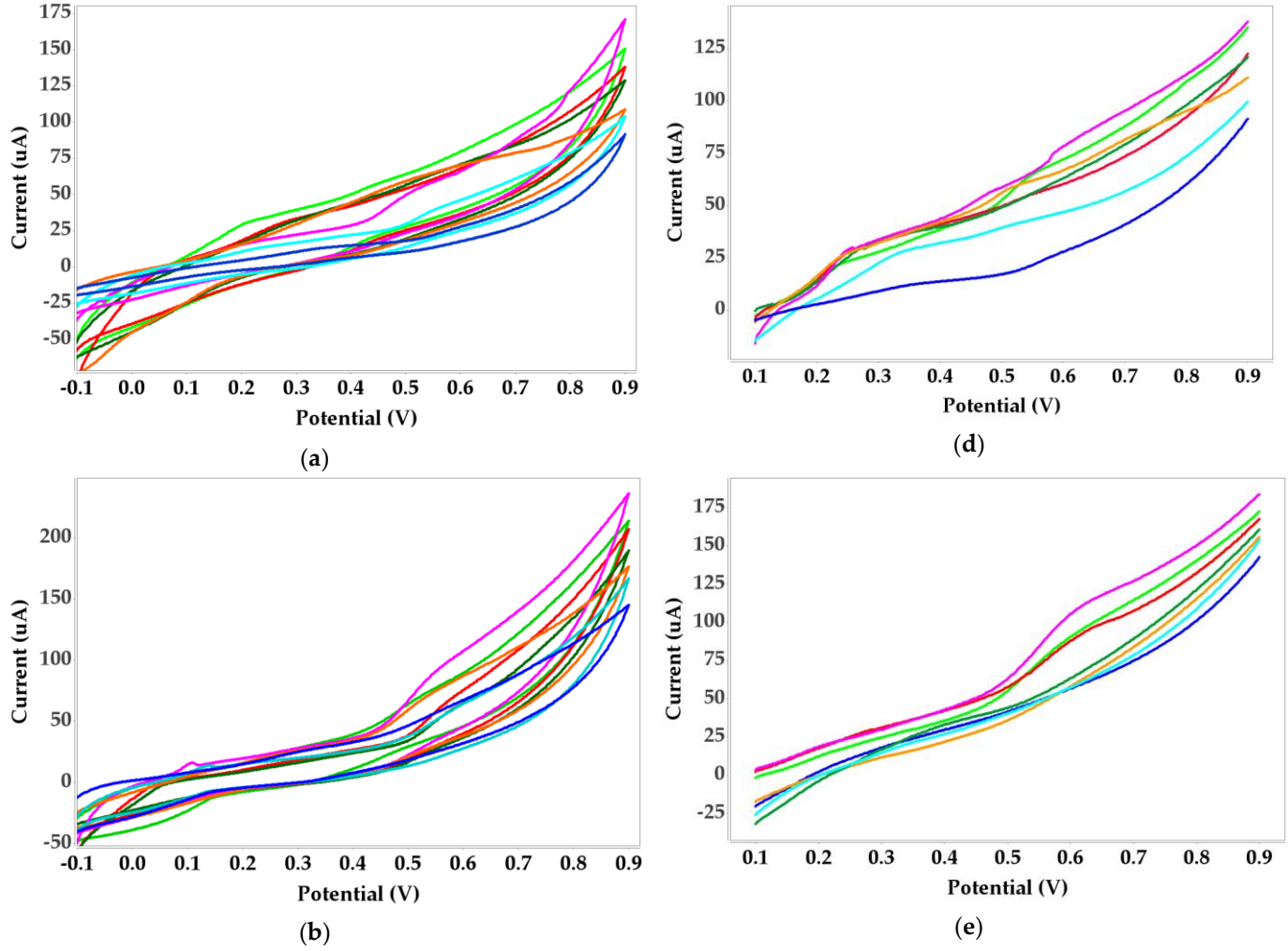


Figure S2. Voltammograms obtained for a nickel standard solution and dimethylglyoxime immobilized with benzophenone; CV with SPEs and (**a**) carbon, (**b**) bismuth, (**c**) silver; LSV with SPEs and (**d**) carbon, (**e**) bismuth, (**f**) silver.



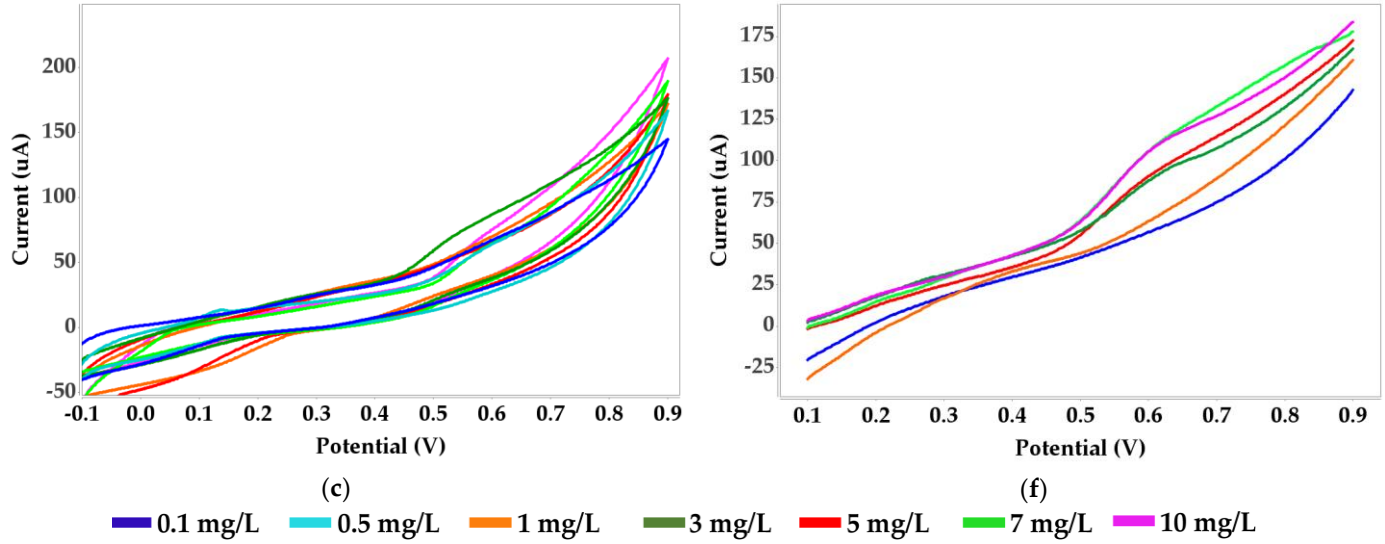
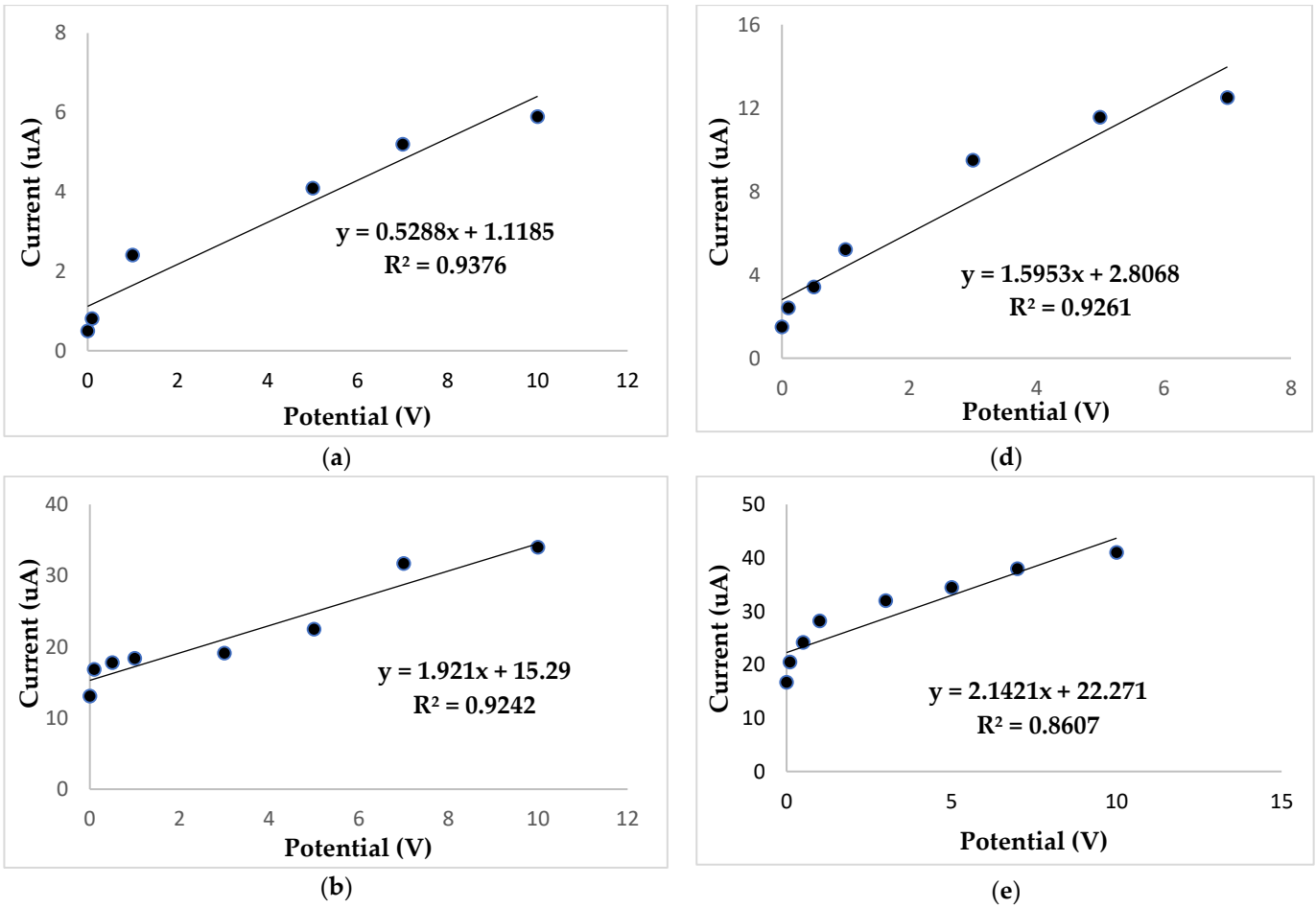
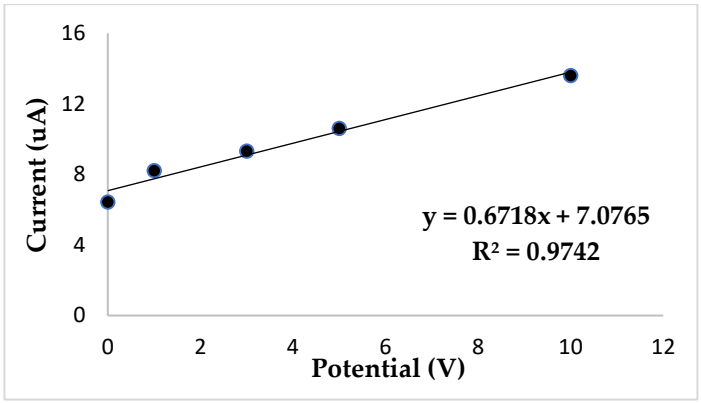
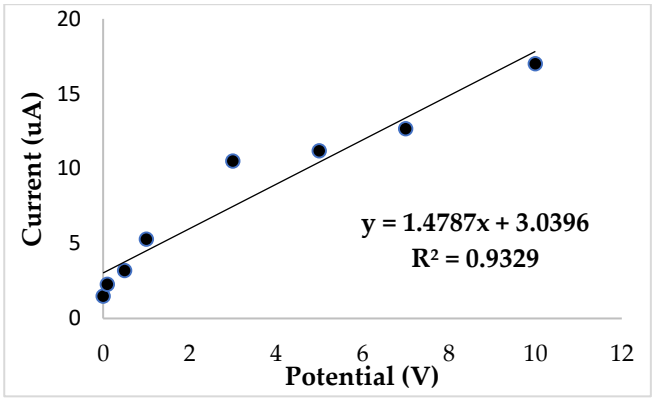


Figure S3. Voltammograms obtained for a nickel standard solution and ethylenediamine immobilized with alginate; CV with SPEs and (**a**) carbon, (**b**) bismuth, (**c**) silver; LSV with SPEs and (**d**) carbon, (**e**) bismuth, (**f**) silver.



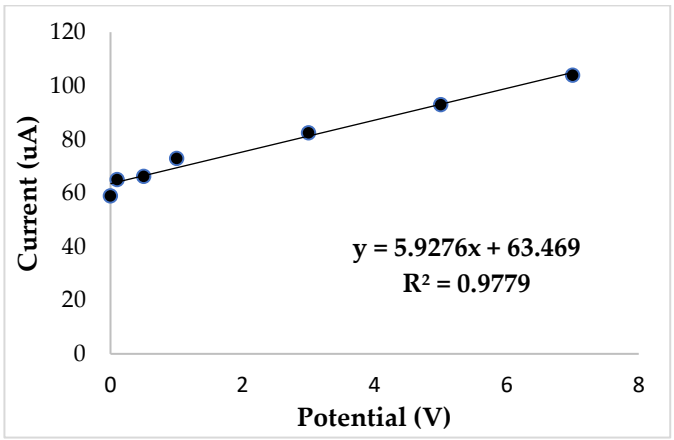


(**c**)

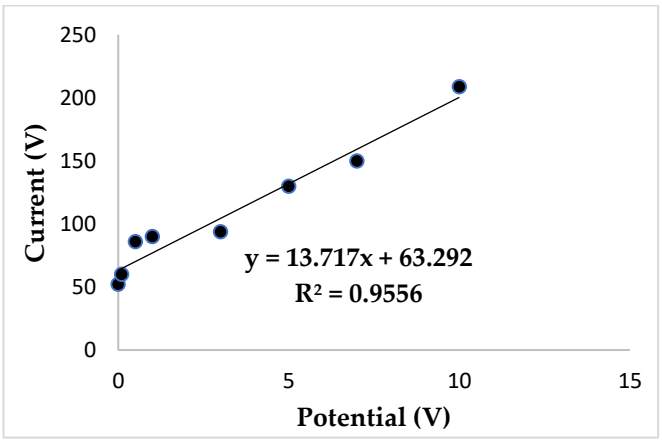


(**f**)

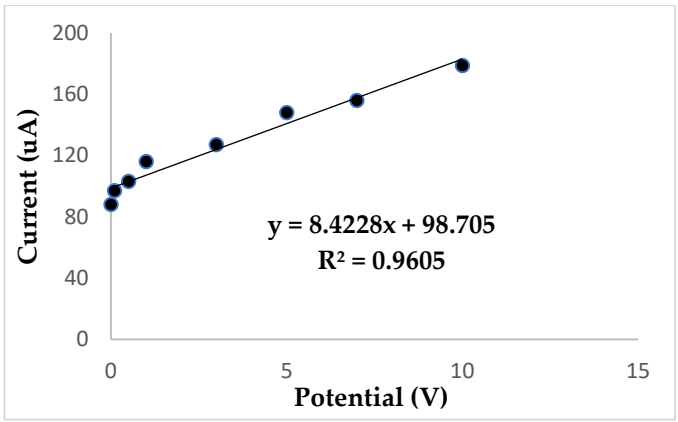
Figure S4. Calibration curves obtained for a nickel standard solution and Protein A-Agarose; CV with SPEs (**a**) carbon, (**b**) bismuth, (**c**) silver; LSV with SPEs (**d**) carbon, (**e**) bismuth, (**f**) silver.



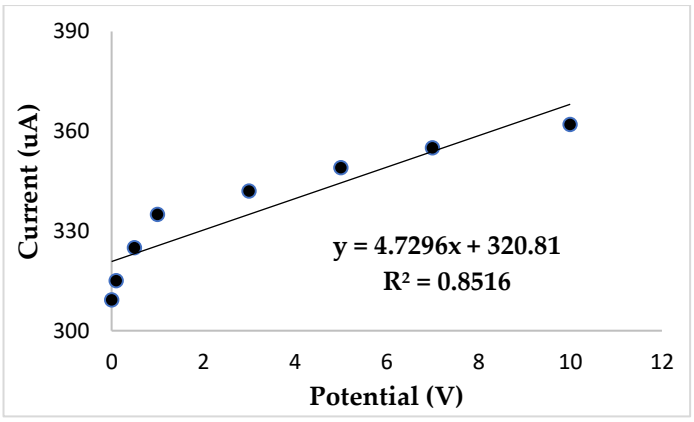
(**a**)



(**d**)

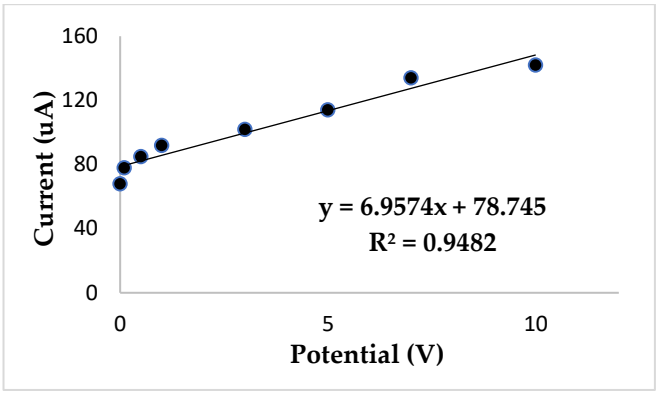


(**b**)



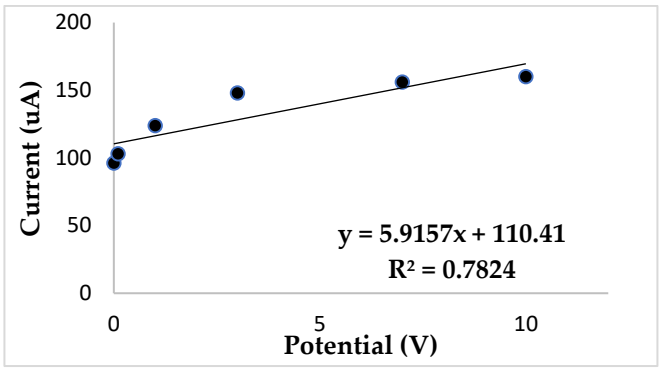
(**e**)

Figure in Main Text

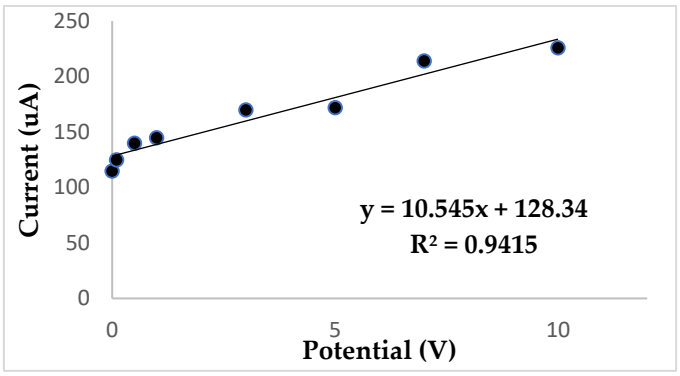


(**c**) (**f**)

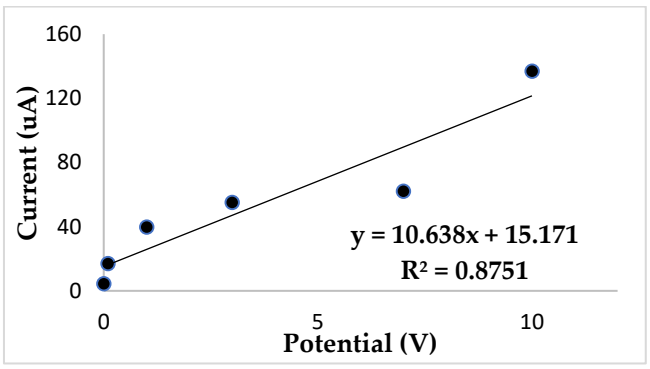
Figure S5. Calibration curves for a nickel standard solution and dimethylglyoxime immobilized with alginate (DMG-alginate); CV with SPEs (**a**) carbon, (**b**) bismuth, (**c**) silver (main text); LSV with SPEs (**d**) carbon, (**e**) bismuth, (**f**) silver.



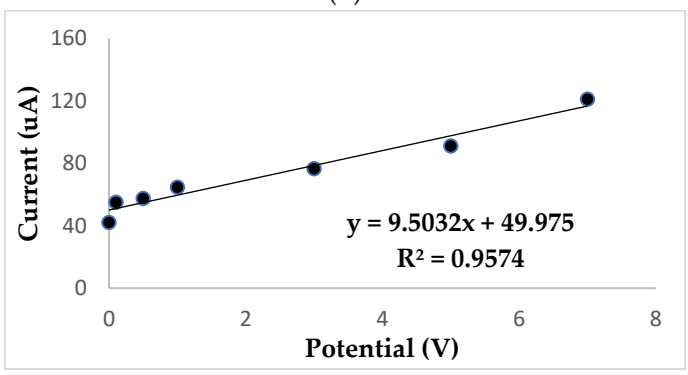
(**a**)



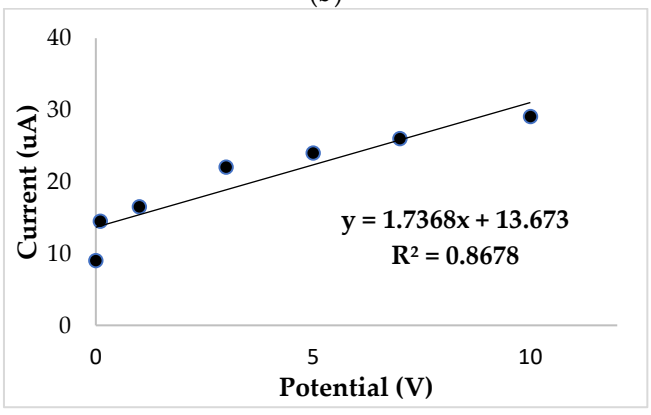
(**d**)



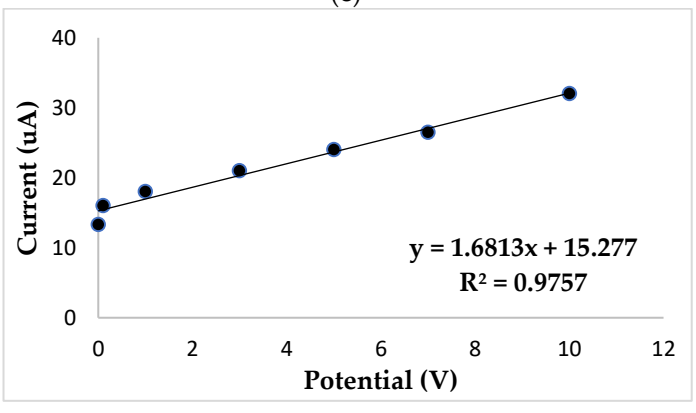
(**b**)



(**e**)

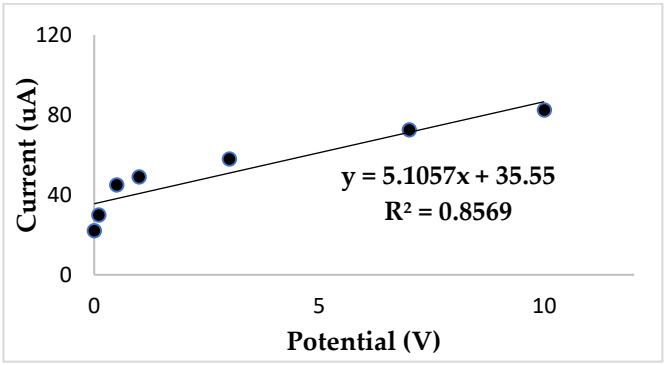


(**c**)

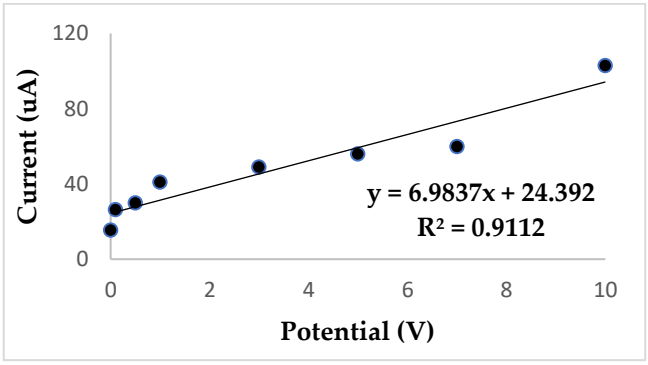


(**f**)

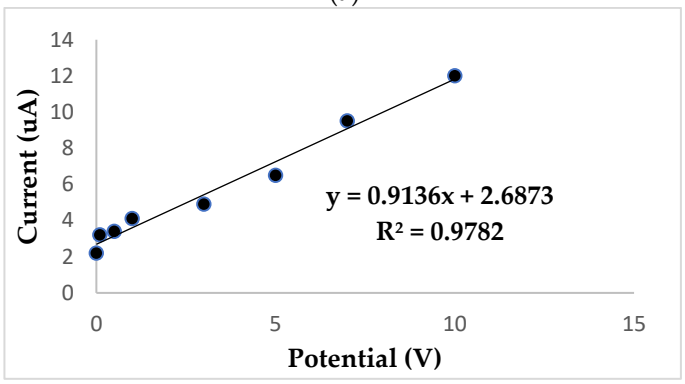
Figure S6. Calibration curves for a nickel standard solution and dimethylglyoxime immobilized with benzophenone; CV with SPEs (**a**) carbon, (**b**) bismuth, (**c**) silver; LSV with SPEs (**d**) carbon, (**e**) bismuth, (**f**) silver.



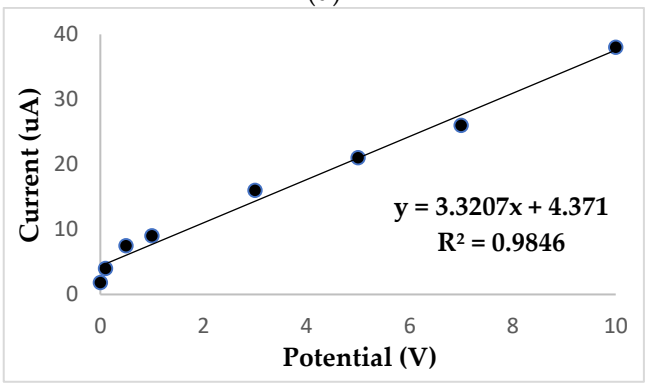
(**a**)



(**d**)

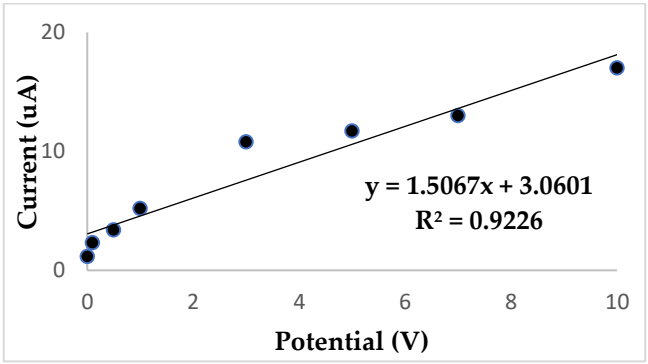


(**b**)



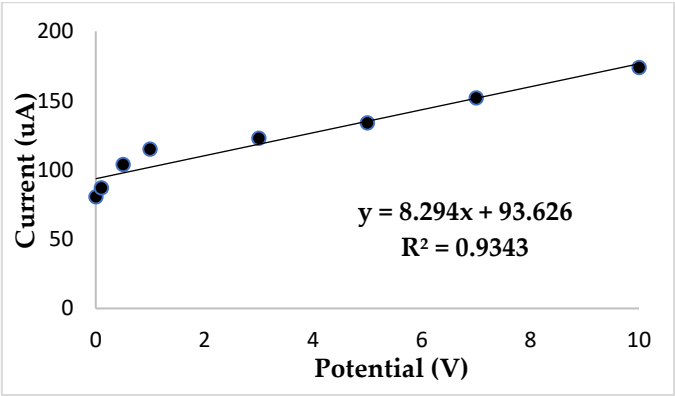
(**e**)

Figure in Main Text

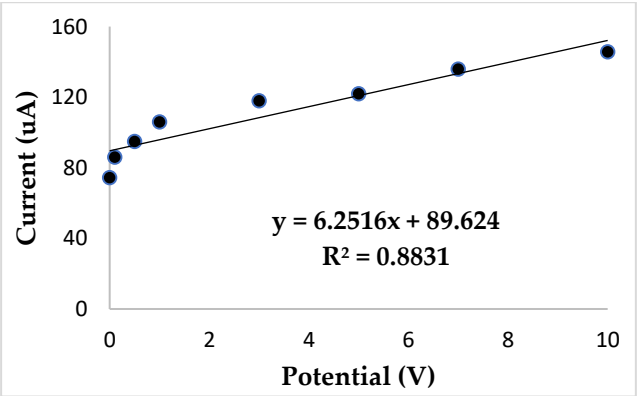


(**c**) (**f**)

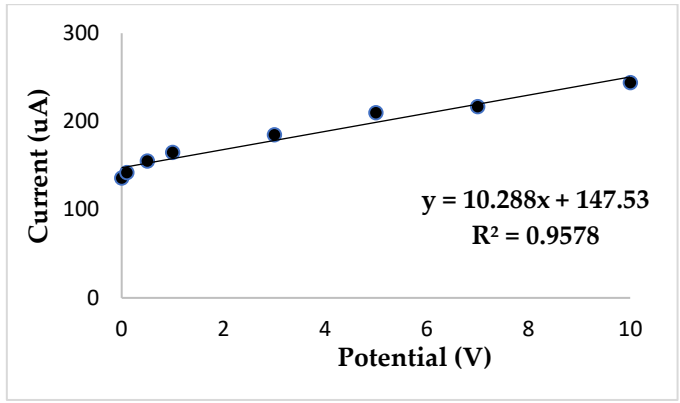
Figure S7. Calibration curves for a nickel standard solution and urease immobilized with alginate; CV with SPEs (**a**) carbon, (**b**) bismuth, (**c**) silver (main text); LSV with SPEs (**d**) carbon, (**e**) bismuth, (**f**) silver.



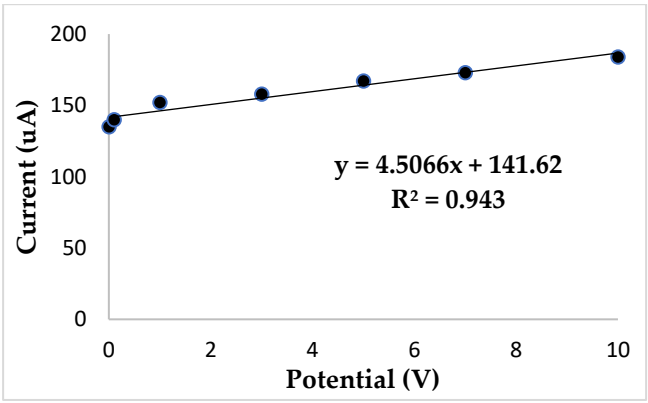
(**a**)



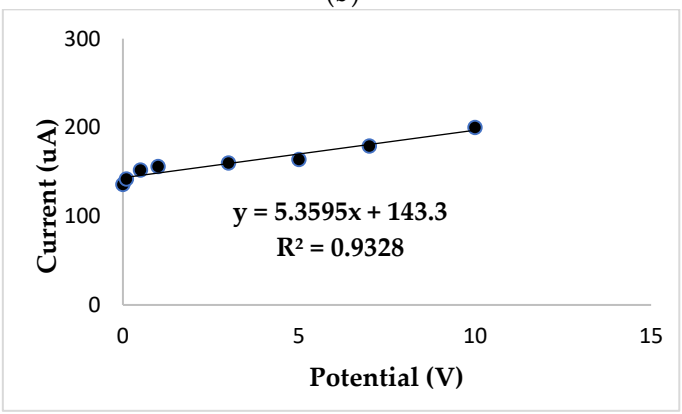
(**d**)



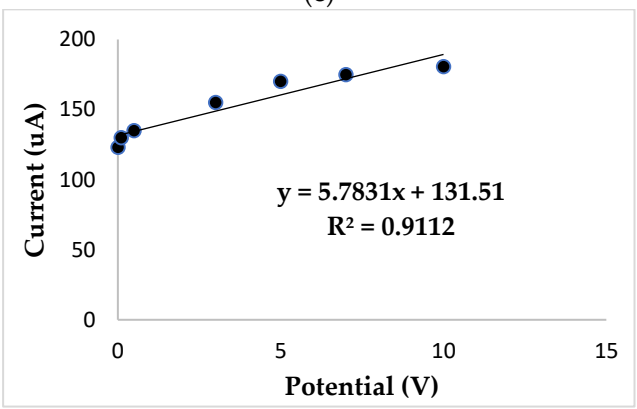
(**b**)



(**e**)



(**c**)



(**f**)

Figure S8. Calibration curves obtained for a nickel standard solution and ethylenediamine immobilized with alginate; CV with SPEs (**a**) carbon, (**b**) bismuth, (**c**) silver; LSV with SPEs (**d**) carbon, (**e**) bismuth, (**f**) silver.