Flexible carbon cloth modified cobalt telluride for sensitive and selective detection of dopamine

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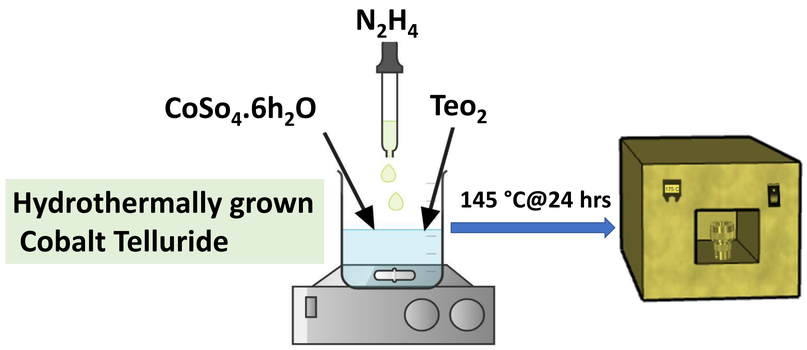
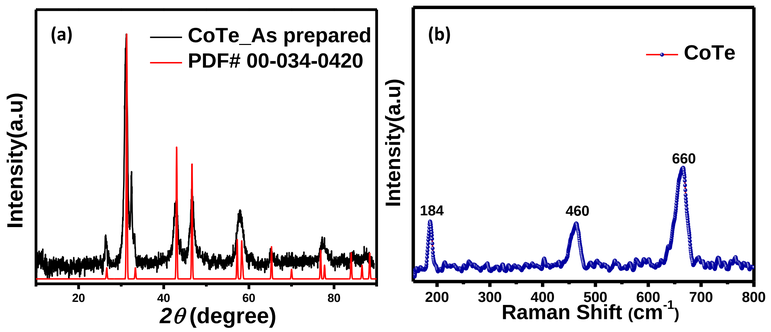
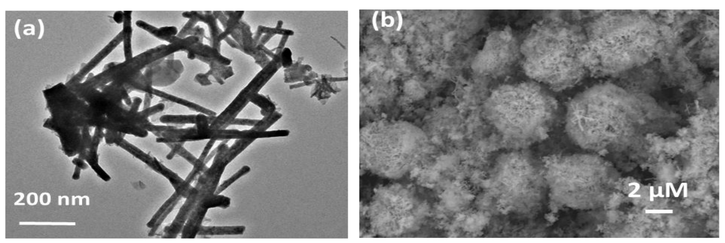
Synthesis Procedure

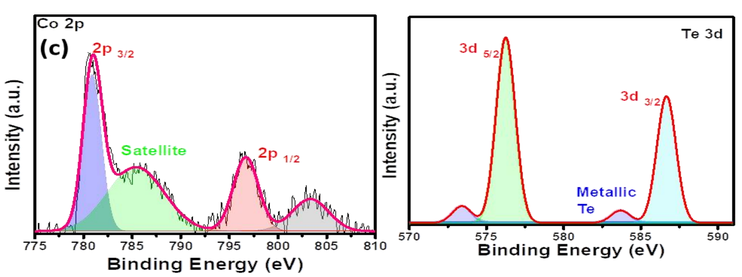


Structural and Morphological Characterizations



(a) PXRD and (b) Raman spectroscopy of as synthesized CoTe.



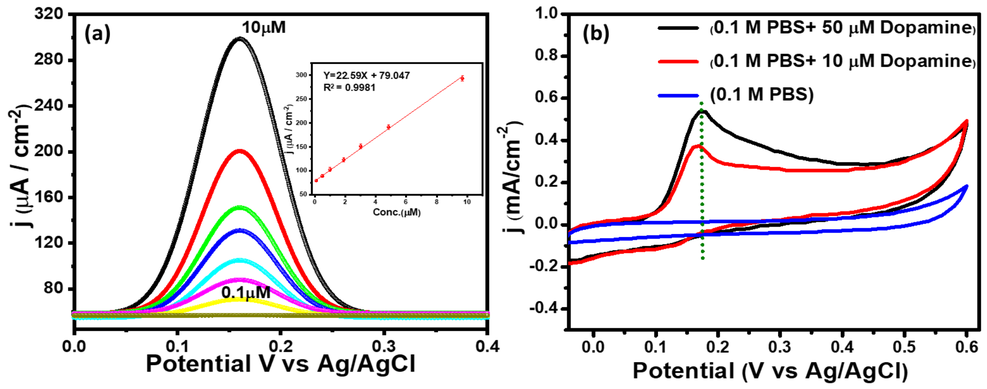


(a) TEM and (b) SEM image of CoTe nanorods. XPS spectra of (c) Co 2p and (d) Te 3d in CoTe.

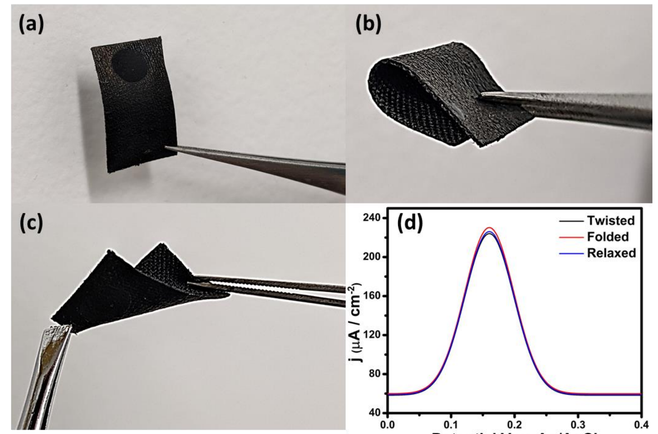
Introduction

In the field of biomedical chemistry, the development of a simple, cost-effective, sensitive biosensor is extremely desirable. Since we thought CoTe (cobalt telluride) is an intriguing possibility, we synthesized Cobalt and Telluride with a hydrothermal method and test the sensitivity by electrodes.
This investigation will help produce portable biosensors and detect dopamine levels easily for patients.

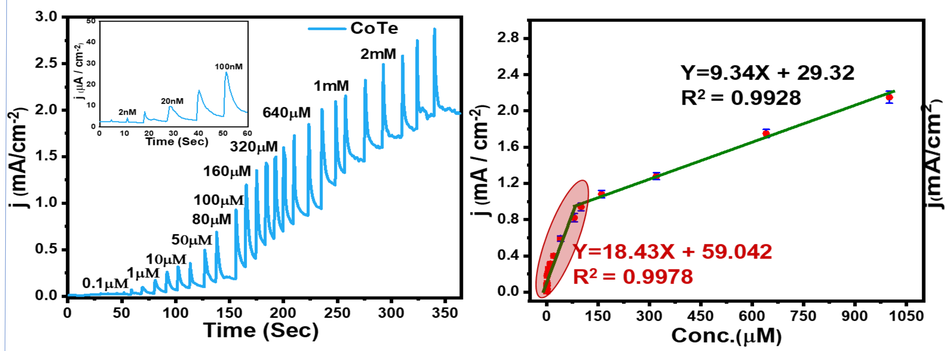
Electrochemical detection of Dopamine



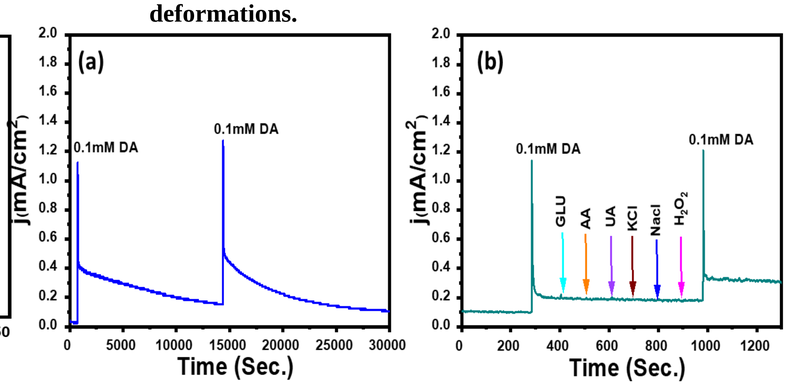
(a) DPV plots of CoTe in 0.1 M PBS buffer in the presence of increasing concentrations of DA. (a) CV of CoTe catalyst with 10 and 50 µM of DA and without DA.



Images of the electroless deposited on flexible carbon cloth electrode under (a) normal, (b) bending, and (c) twisting conditions. (d) DPV plots of CoTe NRs based different deformations.



(a) Chronoamperometric measurements of CoTe catalyst at 0.2 V potential vs Ag/AgCl. Inset shows the linear range from 2 nM to 0.1 µM. (b) Peak current vs concentration of DA at low and high DA concentration



(a) The chronoamperometric response at applied potential of 0.20 V in 0.1 M PBS for long-term stability (b) The chronoamperometric response of DA oxidation on CoTe NRs with successive additions of 0.1 mM dopamine and other common interferents.

Conclusion

Metal chalcogenide-based nanoparticles have been identified as highly efficient electrochemical sensors for the non-enzymatic detection of dopamine which are considered biomarkers for various diseases.

ACKNOWLEDGMENTS

NSF-CHE
NSF-DMR
Missouri S&T Innovation Fund
ACS PRF

Ref: S. Umapathi, H. Singh, J. Masud and M. Nath , Mater. Adv. 2, 927-932 (2020)
Singh, H., Bernabe, J., Chern, J.,Nath, M. et al.. Journal of Materials Research 36, 1413–1424 (2021)