# Document details - Rational design and facile synthesis of binary metal sulfides VS<sub>2</sub>-SnS<sub>2</sub> hybrid with functionalized multiwalled carbon nanotube for the selective detection of neurotransmitter dopamine





Analytica Chimica Acta

Volume 1071, 13 September 2019, Pages 98-108

## Rational design and facile synthesis of binary metal sulfides $VS_2$-$SnS_2$ hybrid with functionalized multiwalled carbon nanotube for the selective detection of neurotransmitter dopamine(Article)

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### Abstract

In this work, we report a sensitive and selective electrochemical sensor for the detection of dopamine (DA) neurotransmitter based on $VS_2$-$SnS_2$/f-MWCNT hybrids. Herein, the binary metal sulfide ($VS_2$-$SnS_2$) was synthesized via single step hydrothermal route and hybrids with f-MWCNT via the ultrasonication process. The as-prepared $VS_2$-$SnS_2$/f-MWCNT hybrids were characterized through the FESEM, EDX and elemental mapping, TEM, XPS, Raman and XRD techniques. The electrochemical performance and catalytic activity of the modified electrodes were probed using electrochemical impedance spectra (EIS), cyclic voltammetry (CV) and differential pulse voltammetry (DPV). Interestingly, DPV results exhibits an appreciable linear range from 0.025 to 1017 μM and LOD of 0.008 μM. The selectivity study was performed to prove the high selectivity of the $VS_2$-$SnS_2$/f-MWCNT hybrids modified electrode. Furthermore, the practical applicability of the DA sensor was scrutinized in human serum sample and rat brain sample. 

### Author keywords

Binary metal sulfides | Dopamine | Functionalized multiwalled carbon nanotube | Hydrothermal synthesis | Vanadium disulfide

### Indexed keywords

Engineering controlled terms: Amines | Carbon disulfide | Catalyst activity | Cyclic voltammetry | Electrochemical electrodes | Electrochemical sensors | Hydrothermal synthesis | IV-VI semiconductors | Nanotubes | Neurophysiology | Semiconducting tin compounds | Tin compounds | Vanadium compounds | Yarn

Engineering uncontrolled terms: Binary metals | Differential pulse voltammetry | Dopamine | Electrochemical impedance spectra | Electrochemical performance | Functionalized multi-walled carbon nanotubes | Hydrothermal routes | Vanadium disulfides

Engineering main heading: Multiwalled carbon nanotubes (MWCN)

Prominence percentile:

EMTREE drug terms: dopamine, multi walled nanotube, sulfide, tin, tin sulfide, unclassified drug, vanadium derivative, vanadium sulfide, agents interacting with transmitter, hormone or drug receptors, carbon nanotube, dopamine, sulfide, tin, tin derivative, tin sulfide, vanadium, vanadium derivative, vanadium disulfide

EMTREE medical terms: animal tissue, Article, catalysis, chemical analysis, chemical structure, controlled study, cyclic potentiometry, differential pulse voltammetry, electrochemistry, elemental analysis, human, impedance spectroscopy, limit of detection, nonhuman, pH, priority journal, Raman spectrometry, rat, surface property, synthesis, transmission electron microscopy, ultrasound assisted extraction, X ray diffraction, X ray photoemission spectroscopy, animal, blood, brain chemistry, chemistry, devices, electrochemical analysis, electrode, procedures, reproducibility, synthesis

MeSH: Animals, Brain Chemistry, Dopamine, Electrochemical Techniques, Electrodes, Humans, Hydrogen-Ion Concentration, Limit of Detection, Nanotubes, Carbon, Neurotransmitter Agents, Rats, Reproducibility of Results, Sulfides, Tin, Tin Compounds, Vanadium, Vanadium Compounds

## Chemicals and CAS Registry Numbers:

dopamine, 51-61-6, 62-31-7; sulfide, 18496-25-8; tin, 14314-35-3, 7440-31-5; vanadium, 7440-62-2;

Dopamine; Nanotubes, Carbon; Neurotransmitter Agents; Sulfides; Tin; Tin Compounds; tin sulfide; Vanadium; Vanadium Compounds; vanadium disulfide

## Funding details


| Funding sponsor | Funding number | Acronym |
|---|---|---|
| Ministry of Science and Technology, Taiwan | 107-2113-M- 027-005-MY3 | MOST |
| Ministerio de Ciencia y TecnologÃa | | MICYT |

Funding text #1

This project was supported by the Ministry of Science and Technology ( MOST 107-2113-M- 027-005-MY3 ), Taiwan, ROC.

Funding text #2

This project was supported by the Ministry of Science and Technology (MOST 107-2113-M- 027-005-MY3), Taiwan, ROC.

**ISSN:** 00032670
**CODEN:** ACACA
**Source Type:** Journal
**Original language:** English
**DOI:** 10.1016/j.aca.2019.04.058
**PubMed ID:** 31128761
**Document Type:** Article
**Publisher:** Elsevier B.V.



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