Document details - One-step sonochemical synthesis of 1D β-stannous tungstate nanorods: An efficient and excellent electrocatalyst for the selective electrochemical detection of antipsychotic drug chlorpromazine

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One-step sonochemical synthesis of 1D β-stannous tungstate nanorods: An efficient and excellent electrocatalyst for the selective electrochemical detection of antipsychotic drug chlorpromazine(Article)

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Abstract

In the modern world, the contamination of ecosystem by human and veterinary pharmaceutical drugs through the metabolic excretion, improper disposal/industrial waste has been subjected to a hot issue. Therefore, exploitation of exclusive structured material and reliable technique is a necessary task to the precise detection of drugs. With this regards, we made an effort for the fabrication of novel one-dimensional (1D) stannous tungstate nanorods (β-SnW NRs) via simple sonochemical approach and used as an electrochemical sensor for the detection of antipsychotic drug chlorpromazine (CPZ) for the first time. The crystallographic structure, surface topology, elemental compositions and their distributions and ionic states were enquired by different spectroscopic techniques such as XRD, FTIR, SEM, EDS, elemental mapping and XPS analysis. The developed β-SnW NRs/GCE sensor exhibits a rapid and sensitive electrochemical response towards CPZ sensing with wide linear response range (0.01–457 μM), high sensitivity (2.487 μA μM^{-1} cm^{-2}), low detection limit (0.003 μM) and excellent selectivity. Besides, the as-proposed electrochemical sensor was successfully applied to real sample analysis in commercial CPZ drug and biological fluids and the acquired recovery results are quite satisfactory. The proposed sonochemical method for the preparation of β-SnW NRs is low cost, very simple, fast and efficient for sensor applications. © 2018 Elsevier B.V.

Author keywords

Biological samples | Chlorpromazine | Electrochemical sensor | Pharmaceutical drug | Sonochemical approach | Stannous tungstate

Indexed keywords

Engineering controlled terms: Chemical detection | Electrocatalysts | Nanorods | Sonochemistry | Spectroscopic analysis | Tungsten compounds | Waste disposal

Engineering uncontrolled terms: Biological samples | Chlorpromazine | Pharmaceutical drugs | Sonochemical | Stannous tungstate

Engineering main heading: Electrochemical sensors

Prominence percentile:

EMTREE drug terms: ascorbic acid, catechol, chlorine, chlorpheniramine maleate, chlorpromazine, copper, cysteine, dopamine, glucose, histidine, lactose, leucine, methionine, metronidazole, multi walled nanotube, nanorod, neuroleptic agent, pyridoxine, riboflavin, serotonin, sodium, stannous tungstate, tin oxide, tryptophan, tungsten derivative, unclassified drug, urea, valine, chlorpromazine, nanotube, neuroleptic agent, tin, tungsten

EMTREE medical terms: Article, cyclic potentiometry, drug blood level, drug determination, drug urine level, electrochemical detection, Fourier transformation, human, infrared spectroscopy, measurement accuracy, normal human, pH, priority journal, reproducibility, sonochemical synthesis, synthesis, tablet, transmission electron microscopy, ultrasound, X ray photoelectron spectroscopy, X ray powder diffraction, chemistry, electrochemical analysis, limit of detection, powder diffraction, procedures, spectroscopy, X ray photoemission spectroscopy

MeSH: Antipsychotic Agents, Chlorpromazine, Electrochemical Techniques, Limit of Detection, Nanotubes, Photoelectron Spectroscopy, Powder Diffraction, Sonication, Spectrometry, X-Ray Emission, Spectroscopy, Fourier Transform Infrared, Tin, Tungsten

Chemicals and CAS Registry Numbers:

ascorbic acid, 134-03-2, 15421-15-5, 50-81-7; catechol, 120-80-9; chlorine, 13981-72-1, 7782-50-5; chlorpheniramine maleate, 113-92-8; chlorpromazine, 50-53-3, 69-09-0; copper, 15158-11-9, 7440-50-8; cysteine, 4371-52-2, 52-89-1, 52-90-4; dopamine, 51-61-6, 62-31-7; glucose, 50-99-7, 84778-64-3; histidine, 645-35-2, 7006-35-1, 71-00-1; lactose, 10039-26-6, 16984-38-6, 63-42-3, 64044-51-5; leucine, 61-90-5, 7005-03-0; methionine, 59-51-8, 63-68-3, 7005-18-7; metronidazole, 39322-38-8, 443-48-1; pyridoxine, 12001-77-3, 58-56-0, 65-23-6, 8059-24-3; riboflavin, 83-88-5; serotonin, 50-67-9; sodium, 7440-23-5; tin oxide, 1332-29-2, 21651-19-4; tryptophan, 6912-86-3, 73-22-3; urea, 57-13-6; valine, 7004-03-7, 72-18-4; tin, 14314-35-3, 7440-31-5; tungsten, 7440-33-7;

Antipsychotic Agents; Chlorpromazine; Tin; Tungsten

Drug tradename:

winsumin

Device tradename:

UP200S

Manufacturers:

Drug manufacturer:

Sigma Aldrich, United States

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