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## Ultrasonication-assisted synthesis of sphere-like strontium cerate nanoparticles ( $\text{SrCeO}_3$ NPs) for the selective electrochemical detection of calcium channel antagonists nifedipine(Article)

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### Abstract

In this work, strontium cerate nanoparticles ( $\text{SrCeO}_3$  NPs, SC NPs) were developed through facile synthetic techniques (Ultrasound-Assisted (UA) and Stirring-Assisted (SA) synthesis) and utilized as an electrocatalyst for the selective and sensitive electrochemical detection of calcium channel blocker nifedipine (NDF). The as-prepared UASC NPs and SASC NPs were characterized using XRD, Raman, TEM, EDS, mapping, XPS and BET analysis which exposed the formation of SC NPs in the form of spherical in shape and well crystalline in nature. BET studies reveal that UASC NPs have maximum surface area than that of SASC NPs. Further, the use of the as-developed UASC NPs and SASC NPs as an electrocatalyst for the detection of NDF. Interestingly, the UASC NPs modified screen printed carbon electrode (UASC NPs/SPCE) exhibited an excellent electrocatalytic activity in terms of lower reduction potential and enhanced reduction peak current when compared to SASC NPs and unmodified SPCE. Moreover, as-prepared UASC NPs/SPCE displayed wide linear response range (LR, 0.02–174  $\mu\text{M}$ ), lower detection limit (LOD, 5 nM) and good sensitivity (1.31  $\mu\text{A } \mu\text{M}^{-1} \text{cm}^{-2}$ ) than that of SASC NPs (LR = 0.02–157  $\mu\text{M}$ , LOD = 6.4 nM, sensitivity = 1.27  $\mu\text{A } \mu\text{M}^{-1} \text{cm}^{-2}$ ). Furthermore, UASC NPs/SPCE showed an excellent selectivity even in the existence of potentially co-interfering compounds such as similar functional group containing drugs, pollutants, biological substances and some common cations/anions. The developed sensor was successfully employed for the determination of NDF in real lake water, commercial NDF tablet and urine samples with acceptable recovery. © 2018 Elsevier B.V.

### Author keywords

Calcium channel antagonists Nanoparticles Nifedipine Sonochemical synthesis Strontium cerate

### Indexed keywords

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cerium nanoparticle nifedipine strontium calcium channel blocking agent nanoparticle  
nifedipine oxide strontium cerium(IV) oxide

EMTREE medical terms:

Article catalyst electrochemical detection priority journal Raman spectrometry  
reduction (chemistry) synthesis transmission electron microscopy ultrasound  
X ray diffraction catalysis chemistry electrochemistry electrode limit of detection  
synthesis

MeSH:

Calcium Channel Blockers Catalysis Chemistry Techniques, Synthetic Electrochemistry  
Electrodes Limit of Detection Nanoparticles Nifedipine Oxides Sonication

### Chemicals and CAS Registry Numbers:

cerium, 7440-45-1; nifedipine, 21829-25-4; strontium, 7440-24-6; oxide, 16833-27-5;

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