

**28<sup>th</sup> Young Investigators' Seminar  
on Analytical Chemistry**

**YISAC 2023**

**BOOK OF ABSTRACTS**



**June 25<sup>th</sup> - 28<sup>th</sup>, 2023.**

Organized by:

**University of Belgrade - Faculty of Chemistry**



Printed by: **PLANETA PRINT**

Publication year: **2023.**

**ISBN-97886-7220-121-5**

## **Organizing committee of YISAC 2023**

Dalibor Stanković (dalibors@chem.bg.ac.rs)

Sladana Đurđić (sladjanadj@chem.bg.ac.rs)

Vesna Stanković (vesna.stankovic@ihtm.bg.ac.rs)

Sladana Savić (sladjana@chem.bg.ac.rs)

Aleksandra Dramićanin (akosovic@chem.bg.ac.rs)

Djurdja Krstić (djurdjakrstic@chem.bg.ac.rs)

Miloš Pešić (mpesic@chem.bg.ac.rs)

Miloš Ognjanović (miloso@vin.bg.ac.rs)

Zorana Milanović (zorana.milanovic@vin.bg.ac.rs)

Darko Kostić (darkoko@chem.bg.ac.rs)

Tijana Mutić (tijana.mutic@pharmacy.bg.ac.rs)

Aleksandar Mijajlović (ssmijajlovic905@gmail.com)

Marija Mirković (mmarija@vin.bg.ac.rs)

Magdalena Radović (magdalena.lazarevic@vin.bg.ac.rs)

## Fabrication of bismuth-oxychloride supported carbon paste electrode for sensitive and selective Quinine sensing

Tijana Mutić<sup>1</sup>, Miloš Ognjanović<sup>2</sup>, Vesna Stanković<sup>3</sup>, Dalibor Stanković<sup>4</sup>

<sup>1</sup>Faculty of Pharmacy, University of Belgrade - Department of Analytical Chemistry, Vojvode Stepe 450, 11000 Belgrade, Serbia

<sup>2</sup>University of Belgrade, VINČA Institute of Nuclear Sciences, Mike Petrovića Alasa 12-14, 11000 Belgrade, Serbia

<sup>3</sup>University of Belgrade - Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia

<sup>4</sup>University of Belgrade – Faculty of Chemistry, Studentski trg 12-16, 11000 Belgrade, Serbia

*tijana.mutic@pharmacy.bg.ac.rs*

Quinine is a natural white crystalline cinchona alkaloid that belongs to the aryl amino alcohol group of drugs, and it has antipyretic (fever reducing), antimalarial, analgesic, anti-inflammatory properties and a bitter taste. Today, quinine is considered as the best antimalarial drug since it is chiefly used in the treatment of falciparum malaria resistant to other antimalarials. Quinine is preferred where the disease has become highly resistant to other antimalarial drugs [1]. Quinine has a low therapeutic index, and it is potentially toxic and causes several side effects including nausea, blurred vision, diarrhea, abdominal pain, headache, fever, renal failure and asthma [2]. Since quinine is widely used as a bittering agent in tonic type drinks, a sensitive and discriminatory system for the discovery of quinine is essential for human health.

In this work, a modified bismuth-oxychloride (BiOCl) carbon paste electrode was prepared for the detection of quinine. BiOCl nanoparticles were synthesized by the chemical coprecipitation method. The electrochemical properties of quinine at this electrode were investigated by cyclic voltammetry (CV), square wave voltammetry (SWV), and differential pulse voltammetry (DPV). In addition, electrochemical impedance spectroscopy (EIS), inductively coupled plasma–optical emission spectrometry (ICP-OES), transmission and scanning electron microscopy (TEM and SEM) and X-ray diffraction (XRD) were used to characterize the synthesized materials. The prepared electrode showed better electrocatalytic response than the bare carbon paste electrode. After square wave voltammetry (SWV) optimization, the electrode showed a wide linear working range from 20 to 200  $\mu\text{M}$  at pH 6 of Britton–Robinson buffer solution (BRBS) as the supporting electrolyte. The excellent selectivity of the proposed method, with good repeatability and reproducibility, strongly suggests a potential application of the method for the determination of quinine in pharmaceuticals. The practicality with good recoveries indicates that the morphology of the materials is closely related to other parameters, which in turn suggests that the developed approach can provide a cost effective, rapid, selective, and sensitive method for quinine monitoring.

### References

- [1] R. A. Dar, P. K. Brahman, S. Tiwari, and K. S. Pitre, "Electrochemical studies of quinine in surfactant media using hanging mercury drop electrode: A cyclic voltammetric study," *Colloids Surf B Biointerfaces*, **2012**, *98*, 72–79.
- [2] F. Azadmehr and K. Zarei, Fabrication of an imprinted electrochemical sensor from l-tyrosine, 3-methyl-4-nitrophenol and gold nanoparticles for quinine determination, *Bioelectrochemistry*, **2019**, *127*, 59–67.