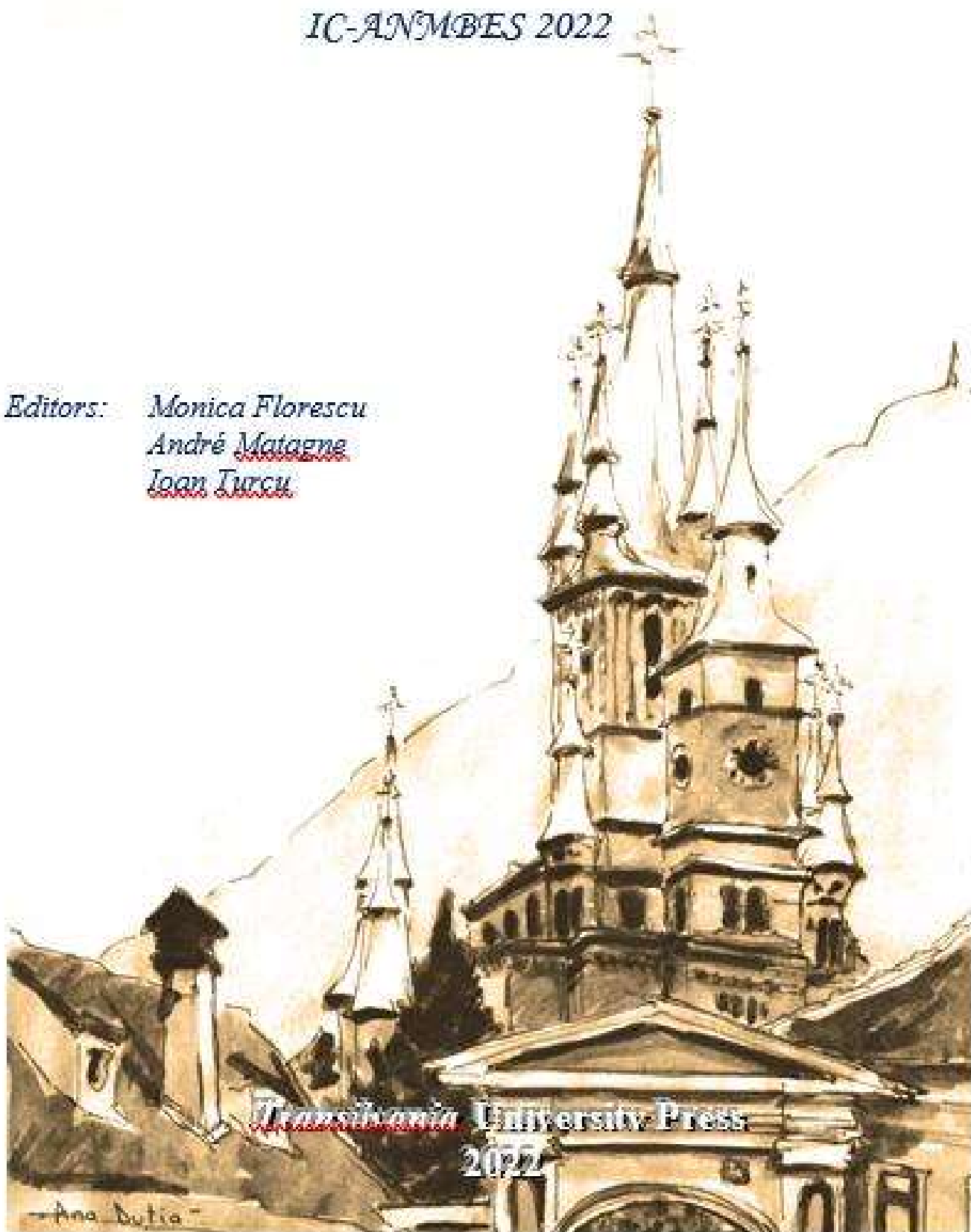


*Analytical and Nanoanalytical Methods for
Biomedical and Environmental Sciences*

IC-ANMBES 2022

*Editors: Monica Florescu
André Matagne
Ioan Turcu*



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O15. Electrochemical method for mercury detection in wastewater samples using a portable device

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The aim of the study was to verify the performance parameters of the proposed method for the determination of Hg(II) in wastewater. The method using screen-printed carbon electrodes modified (ECS) with poly L films (ECS-polyL) was validated in-house following the standard procedure for analytical methods.

ECS containing carbon working electrode (2 mm diameter), carbon auxiliary electrode and Ag/AgCl reference electrode (BVT Technologies, Czech Republic) were used. An organic ligand (polyL) capable of complexing Hg(II) ions was deposited on the carbon working electrode surface. The potentiostat used was a portable PalmSens 4 type, coupled to a laptop and equipped with a PSTrace Software. The method consisted in three steps. First step was to apply Cyclic Voltammetry (CV) and Differential Pulse Voltammetry (DPV) on the modified electrode in acetate buffer solution at pH = 3 for 5 minutes. Second stage was deposition of Hg(II) ions on the electrode for 20 minutes in a solution of Hg(II) with same acetate buffer. The last stage consisted in insertion of the electrode after washing with ultrapure water in acetate buffer at pH = 3 and performing the DPV procedure for 10 minutes.

The maximum admissible value in wastewater according to Romanian legislation is 50 µg/L. At this value, the measurement accuracy (14%) and uncertainty (18%) were determined, as well as the tests to verify the robustness of the method.

The robustness tests indicate that ± 10% variation of pH and acetate buffer concentration does not significantly affect the method, while reaction time has a strong effect on the procedure and makes the method less robust from this point of view. The advantages of the method are inexpensive equipment, portable, suitable for field determination; small size of the electrodes used; simplified procedure; reaction medium does not require controlled atmosphere.

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