

Batch Injection Analysis with Novel Electrode Materials

Possibilities and Limitations

Jiri Barek

Charles University, Faculty of Science, Department of Analytical Chemistry, UNESCO Laboratory of Environmental Electrochemistry Albertov 6, 128 43 Prague 2, Czech Republic
*E-mail: barek@natur.cuni.cz

ABSTRACT

Large scale high throughput monitoring of biologically active organic compounds is one of the most important tasks of recent electroanalytical chemistry. Modern voltammetric/amperometric methods play an important role in this field because of low running and investment costs, easy automation and miniaturization, user-friendliness, portability and reasonable sensitivity and selectivity¹. Batch injection analysis is especially suited for these purposes². Moreover, it successfully minimises most problems with working electrode passivation³. Approaches used in our UNESCO Laboratory of Environmental Electrochemistry to further develop this promising technique will be discussed.

Keywords: Amperometry, Batch Injection Analysis, Electrochemistry in Flow Systems, Novel Electrode Materials, Voltammetry.

INTRODUCTION

The presentation will focus on six types of novel electrode materials used in our UNESCO Laboratory of Environmental Electrochemistry with so far untapped potential in Batch injection analysis:

- A. Metallic film electrodes
- B. Carbon based electrodes
- C. Chemically modified electrodes
- D. Enzyme modified electrodes
- E. Nanoparticles modified electrodes
- F. Nanoenzymes modified electrodes

OBJECTIVES

Possibilities and limitations of above mentioned novel electrode materials in combination with Batch injection analysis will be discussed and compared with their advantages/disadvantages in combination with other flowing systems.

METHODOLOGY

Optimization of conditions for fabrication of envisaged novel electrode materials inspired by our experience with their application in high performance liquid chromatography with electrochemical detection and flow injection analysis with electrochemical detection will be outlined and discussed.

CONCLUSION/RESULTS

The importance of Batch injection analysis can be supported by the fact that nearly 2 000 references with Batch injection analysis as keyword can be found in Web of Science database. The basic problems connected with

conversion of classical voltammetric/ampereometric techniques using novel electrode materials to Batch injection analysis are as follows:

1. Mechanically stable, robust, long-life working electrode with low noise and background current, with broad potential window and high resistance to passivation by electrode reaction products or matrix components.
2. Simple, inexpensive, portable and user-friendly equipment for easy implantation of Batch injection analysis.
3. Advantages of Batch injection analysis can be better utilized if we introduce novel electrode materials into this excellent analytical technique and verify their suitability for large scale high throughput monitoring of biologically active organic compounds in complex matrices.

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