

Libuše Trnková – Founder of Elimination Voltammetry

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In the nineties of the last century, new electrochemical method called Elimination Polarography, lately Elimination Voltammetry with Linear Scan (EVLS), was developed and successfully tested for various chemical and biochemical purposes. The EVLS procedure provides an improvement of voltammetric results through eliminating and conserving various particular currents, of which the total current is composed. The general idea of the method is based on the application of certain elimination functions formed by linear combination of total currents measured at different scan rates. Then, the elimination process provides further information on electrochemical mechanisms. Libuše Trnková belongs to the key person in the development and application of the method.

Keywords: Electrochemistry; Elimination Voltammetry; Nucleic Acids

1. INTRODUCTION

At October 2012 in Brno, Czech Republic, 2nd Conference called Elimination Day, in which we celebrated the birthday of a major Czech scientist in the field of theoretical physics and chemistry, Assoc. Prof. Libuše Trnková, Ph.D., took place. During her undergraduate studies at the University of Jan Evangelista Purkyně, Brno, Czech Republic (now Masaryk University), she was one of the best students in class and graduated with honours in 1970. The results of her thesis "Dipole moments of chloro-derivatives of furans" and her hard work were awarded by successfully defending of doctor thesis. Shortly, after defending the thesis, Assoc. Prof. Trnková was being hired as assistant lecturer at the Department of Theoretical and Physical Chemistry, Faculty of Science, University of Jan Evangelista Purkyne, where she has been working till now. She defended her CSc. (Ph.D.) in 1984 on the theme "Electrochemical behaviour of purine derivatives on mercury", which described the results,

which are still cited even after 20 years from their discovery [1,2]. In these papers, she and her colleagues aimed their attention at studying of electrochemical behaviour of guanine. She discovered that electrochemical signal of guanine is oxidative signal of guanine product of reduction at mercury electrode. Her enthusiasm for scientific and educational activities culminated in a successful defence of habilitation entitled “Application of modern electrochemical methods in biophysical chemistry” in 2000. It is necessary to mention that all the mentioned theses have been defended in the field of theoretical physics and chemistry.



Photo of Libuše Trnková in her office in old campus of Department of Theoretical and Physical Chemistry, Faculty of Science, Masaryk University, Brno, Czech Republic.

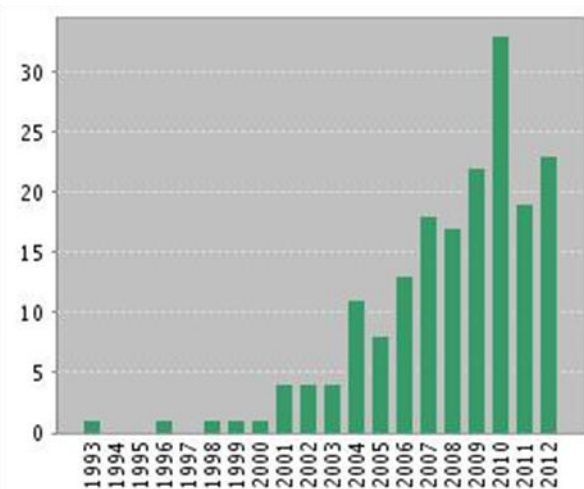
In the nineties of the last century, she has been strongly involved in the practical testing of the theoretical work of Professor Dračka aimed at developing of new electrochemical method called Elimination Polarography. She succeeded and confirmed theory of Elimination Polarography [3-5]. Elimination Voltammetry with Linear Scan (EVLS) is the newest powerful electrochemical tool in elimination methods, which originated with the elimination polarography (EP) [3,6-28]. The EVLS procedure provides an improvement of voltammetric results through eliminating and conserving various particular currents, of which the total current is composed. The general idea of the method is based on the application of certain elimination functions formed by linear combination of total currents

measured at different scan rates. Then, the elimination process provides further information on electrochemical mechanisms.

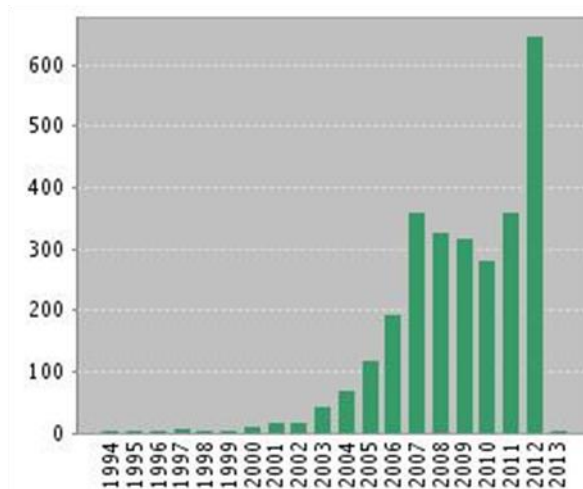
Since 2000 she has began to electrochemically study nucleic acids and applying elimination voltammetry for these purposes. The complexity of the studied problem led to a further concentration on shorter and more defined fragments of oligonucleotides. The physico-chemical complexity of the solved task mirrors in finding some interesting structural motifs. They have been studied using electrochemistry, UV-spectrophotometry and circular dichroism. She managed to get a significant amount of unique results, which form a very good basis for understanding the extremely biologically important processes such as hybridization. In 2005/6 she and her colleagues were able to design and verify the possibility of a double elimination voltammetry, which brings opportunities how to enhance sensitivity of nucleic acids determination. In addition, the question of the electrochemical behaviour of guanine is again opened. In recent years, the attention of Libuše Trnková is directed to nanotechnology, modified electrodes, new material and aptamers.

Scientometric evaluation of her work shows that Assoc. Prof. Trnková meets European criteria, because she is author and/or co-author of more than 150 ISI indexed papers with more than 2,500 citations (1600 cited without self-citations) and h-index 30 [29] according to Web of Science (20. 10. 2012, figures below).

Published Items in Each Year



Citations in Each Year



The role of the teacher is equally important because she helps students with their first steps in science not only at Masaryk University, where she established new branch called Biophysical Chemistry, but also at Mendel University in Brno and now at the Central European Institute of Technology CEITEC (Jiří Friml, well known plant biochemist and biologist, belongs to her graduate students). In addition, it is professionally and pedagogically linked to the Institute of Biophysics of the Academy of Sciences of the Czech Republic. New experiences and knowledge are still passing from Assoc. Prof. Trnkova to undergraduate and postgraduate students, and post docs not only from the Czech and Slovak Republic, but also from Spain and Turkey. Her enthusiasm and hard work is great inspiration for all their neighbours.

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