New Electrode Materials and Arrangements for Large Scale Monitoring of Environmental Pollutants

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The presentation will focus on new electrode materials (solid silver amalgams, carbon films, boron doped diamond, bismuth and antimony) used in our UNESCO Laboratory of Environmental Electrochemistry for voltammetric and/or amperometric monitoring of submicromolar concentrations of various biologically active organic compounds (environmental carcinogens, biomarkers of exposure, treatment or illness, pesticides, nitrophenols and other priority pollutants, dyes, drugs and their metabolites, etc.) in various biological and environmental matrices. Their advantages and disadvantages will be critically compared together with methods of pre-treatment and approaches to prevent their passivation. Attention will be paid to their use both in batch arrangements (voltammetry in single drop of the solution, in membrane separated micro vessels, etc.) and in flowing systems (high performance liquid chromatography or flow injection analysis with amperometric detection using thin-layer, wall-jet, tubular or microcylinder arrangements). At the end, the combination of these newly developed methods with advanced methods for preliminary separation and/or preconcentration (solid phase extraction, membrane separation, hollow fibre microextraction, etc.) will be discussed and their applications to the determination of organic compounds in biological (urine, blood, plasma, etc.) and environmental (drinking, river, and waste water) matrices will be discussed.

Biography

Professor Barek completed his PhD at Charles University in Prague, where he worked since 1976 as a lecturer, reader and professor. He is the Head of the UNESCO Laboratory of Environmental Electrochemistry at Charles University, Prague, affiliate member of the steering committee of Division V (Analytical chemistry) of IUPAC and member of the steering committee of Division of Analytical Chemistry of European Chemical Society. He is an author and a co-author of more than 500 publications in electroanalytical chemistry in refereed journals, and of 17 chapters in monographs devoted mainly to electroanalytical methods. His main research interests include i) electrochemical determination of trace amounts of biologically active organic substances, e.g. chemical carcinogens, biomarkers, drugs and their metabolites, pesticides, dyes and dye-industry intermediates, etc. ii) high-performance liquid chromatography and flow injection analysis of the above mentioned substances with electrochemical detection, iii) development of new electrochemical sensors and detectors.

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