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# Laboratory of Electrophoretic Separation Methods

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## Offer

- Development and testing of new methods and instrumentation for microscale separation
- Expertise in the area of microscale separation techniques
- Cooperation with partners on development and construction of electrochemical detectors for microscale separation techniques
- Cooperation on development of electrophoretic strategies for rapid determination of various organic molecules in clinical samples (usable in various pharmacological and physiological studies)
- Cooperation with technological companies and research groups in this field

## Know-how & Technologies

- New methodologies based on electromigration for determination of analytes in clinical and other environmental matrices
- Very short analysis time, very little sample volume is required
- Development of instrumentation for electrochemical detection and sample introduction in microscale separation techniques

## Research Area & Excellence

- Development of new electrophoretic strategies for rapid determination of amino acids, saccharides and other metabolites in various clinical samples that represents background for solution of different pharmacological and physiological studies
- Construction and optimization of electrochemical detectors for microscale separation techniques
- Development of new preconcentration techniques of biological samples that are based on electrophoretic principle

## Key Research Equipment

- Agilent 7100 Capillary Electrophoresis System and HP3D Capillary Electrophoresis System (Agilent Technologies) equipped with diode-array detector, contactless conductivity detector, fluorescence detector ARGOS 250B (Flux Instruments) and mass spectrometry detector CE/MS Single Quad ES Superior Line Bundle (Agilent Technologies)
- Microchip electrophoresis with a lab-built contactless detector
- Fully equipped biochemical laboratory for preparation and processing of the samples

## Achievements

Technique of sampling low volume analytes (as low as 1 µl) is currently in the process of intellectual property protection.

## Partnerships & Collaborations

Department of Analytical Chemistry, Faculty of Science, Charles University in Prague | J. Heyrovský Institute of Physical Chemistry | Institute of Physics | Department of Sport Medicine, Third Faculty of Medicine, Charles University in Prague | 2nd Internal Department of Third Faculty of Medicine and Faculty Hospital Královské Vinohrady | Centre for Research on Diabetes, Metabolism and Nutrition, Charles University in Prague | Department of Pharmacology, Third Faculty of Medicine, Charles University

## Important Publications

- Tůma P., Opekar F., Jelínek I.: *A Contactless Conductometric Detector with Easily Exchangeable Capillary for Capillary Electrophoresis*, *Electroanalysis* 2001, 13, 989–992. [http://dx.doi.org/10.1002/1521-4109\(200108\)13:12<989::AID-ELAN989>3.0.CO;2-C](http://dx.doi.org/10.1002/1521-4109(200108)13:12<989::AID-ELAN989>3.0.CO;2-C), IF2001 1,702, 59 times cited.
- Tůma P., Opekar F., Štulík K.: *Contactless conductivity detector for capillary zone electrophoresis - effect of the detection cell geometry on the detector performance*, *Electrophoresis* 2002, 23, 3718–3724. [http://dx.doi.org/10.1002/1522-2683\(200211\)23:21<3718::AID-ELPS3718>3.0.CO;2-U](http://dx.doi.org/10.1002/1522-2683(200211)23:21<3718::AID-ELPS3718>3.0.CO;2-U), IF2002 4,325, 52 times cited.
- Tůma P., Samcová E., Andělová K.: *Determination of free amino acids and related compounds in amniotic fluid by capillary electrophoresis with contactless conductivity detection*, *J. Chromatogr. B* 2006, 839, 12–18. <http://dx.doi.org/10.1016/j.jchromb.2005.12.020>, IF2006 2,647, 52 times cited.

- Tůma P., Samcová E., Opekar F., Jurka V. and Štulík K.: *Determination of 1-methylhistidine and 3-methylhistidine by capillary and chip electrophoresis with contactless conductivity detection*, Electrophoresis 2007, 28, 2174–2180. <http://dx.doi.org/10.1002/elps.200600697>, IF2007 3,609, 23 times cited.
- Tůma P., Samcová E., Duška F.: *Determination of Ammonia, Creatinine and Inorganic Cations in Urine using CE with Contactless Conductivity Detection*, J. Sep. Sci. 2008, 31, 2260–2264. <http://dx.doi.org/10.1002/jssc.200700655>, IF2008 2,746, 25 times cited.
- Tůma P., Málková K., Samcová E., Štulík K.: *Rapid Monitoring of Arrays of Amino Acids in Clinical Samples Using Capillary Electrophoresis with Contactless Conductivity Detection*, J. Sep. Sci. 2010, 33, 2394–2401. <http://dx.doi.org/10.1002/jssc.201000137>, IF2010 2,631, 31 times cited.

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