Department of Bioanalytical Instrumentation

/ Institute of Analytical Chemistry
/ Academy of Sciences of the Czech Republic

CEITEC
central european institute of technology
BRNO | CZECH REPUBLIC

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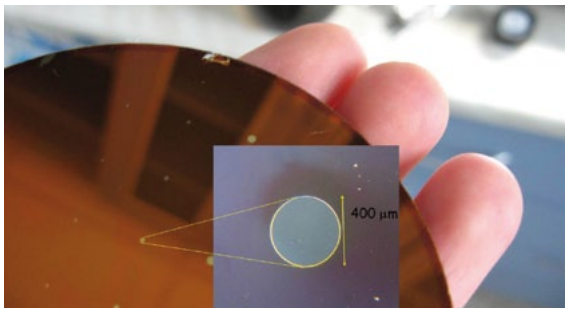

THEMATIC RESEARCH FOCUS

RESEARCH AREA

Research of methods and their combinations and development of their applications especially for bioanalytical objects.

EXCELLENCE

Microcolumn separations – mass spectrometry coupling

MISSION

Exploring the world of Capillary Separations - Mass Spectrometry Coupling, Microfluidics and Single Cell Analysis.

DEVELOPED TECHNOLOGIES

CONTENT OF RESEARCH

- Capillary separations
- Mass spectrometry coupling
- Enzymatic microreactors
- Microfabrication – Microfluidics
- Single cell analysis

MAIN CAPABILITIES

Electrospray interface for coupled column ITP system – presentment of application for patenting, others are in preparation. Capillary fraction collector, thermostat box for DNA analysis.

- International patents are granted together with Ing. Klepárník in cooperation with Barnett Institute in Boston

Miniaturized multidetector for conductivity, absorbance and fluorescence detection at a single site capillary.

- Presentment of application in Ireland in cooperation with Dublin City University (prof. Macka)

FIELDS OF RESEARCH RESULTS APPLICATION

- Biomedicine
- Biotechnology (diagnostic, medical equipment)
- Waste water treatment
- Chemical industry

NUMBER OF RESEARCH POSITIONS

SENIOR RESEARCH STAFF

3

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

8

KEY RESEARCH EQUIPMENT

LIST OF DEVICES

- Laser lithograph
- Laser detection systems
- 3 electrospray mass
- Spectrometers
- CE and HPLC instruments

BUDGET

TOTAL (MIL. CZK/ MIL. EUR)

5 / 0.2

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

10

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

2

MAIN PROJECTS

2006-2010: Integrated bioanalytical technologies for microanalyses and diagnostics with laser induced fluorescence and mass spectrometry coupling (project LC06023 financed by the Ministry of Education, Youth and Sports)

2006-2010: Nanotechnologies for protein and gene diagnostics (project KAN400310651 financed by the Academy of Sciences of the Czech Republic)

2006-2008: Microfluidic instrumentation for analyses of biopolymers modified by structural probes (project GA203/06/1685 financed by the Czech Science Foundation)

ACHIEVEMENTS

Selected high impact publications:

- Editing of yearly special issues of Electrophoresis on Miniaturization since 2000.
- Lazar, I.M., Grym, J., Foret, F. Microfabricated devices: a new sample introduction
- approach to mass spectrometry. Mass Spectrometry Reviews, 2006, 25, 573– 594.
- Křenková, J., Foret, F. Immobilized microfluidic enzymatic reactors. Electrophoresis, 2004. 25, 3550-3563.

Patents:

- Karger, B. L., Kotler; L., Foret, F., Minarik, M., Kleparnik, K. Multichannel microscale system for high throughput preparative separation with comprehensive collection and analysis. US Patent # 7,578,915, 2009.
- Foret; F.; Karger; B. L. Parallel array of independent thermostats for column separations. U.S. Patent # 6,929,731, 2005.
- Foret; F.; Rejtar; T.; Zhang; B.; Karger; B. L. Parallel sample loading and injection device for multichannel microfluidic devices. U.S. Patent #6,939,452, 2005.
- Karger, B.L., Foret, F., Preisler, J. On-line and off-line deposition of liquid samples for matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectroscopy. U.S. Patent # 6,825,463, 2004.

Organization of international conferences:

- Founders and organizers of the international interdisciplinary symposium on bioanalysis CECE 2004 - 2011.
- Organization of the prestigious international conference MicroScale Bioseparations - MSB2010.

Membership in editorial boards of international journals:

- Electrophoresis
- Journal of Chromatography
- Journal of Separation Science
- Biomacromolecular Mass Spectrometry
- Current Analytical Chemistry
- The Open Proteomics Journal

MAIN COLLABORATING PARTNERS

COLLABORATIONS WITH ACADEMIC PARTNERS

- Institute of Biophysics, Academy of Sciences of the Czech Republic (Brno, CZ)
- Faculty of Science, Masaryk University (Brno, CZ)
- University Hospital (Brno, CZ)
- Masaryk Memorial Cancer Institute (Brno, CZ)
- DCU (Dublin, IE)
- CNR (Rome, IT)
- Barnett Institute (Boston, US)
- IFI CISC (Madrid, ES)
- University of Debrecen (Debrecen, HU)

COLLABORATION WITH COMPANIES

- BVT (Brno, CZ)
- Villa Labeco (SK)
- Genomac, Watrex (Prague, CZ)
- Applied Biosystems (US)
- Gyros (SE)

EXPECTATIONS

REQUIREMENT

We are looking for industrial partners in the Czech Republic as well as abroad.

OFFERS

Capacity in designing and fabrication of microdevices, preparation of surface modified quantum dots, bioanalytical method development