Mgr. Petra Jusková
Supervisor: Ing. František Foret CSc.

Masaryk University, Kotlářská 2, 61137 Brno,
Institute of Analytical Chemistry of the ASCR, v. v. i., Veveří 97, 60200 Brno

Lithographic technique and thin metal film deposition in bioanalytical instrumentation.

Lithographic microfabrication techniques frequently represent key step in construction of the miniaturized systems for bioanalytical applications. Desired pattern can be transferred to different substrates with high resolution allowing prototyping as well as mass production of the new devices. Downscaling of the detection and reaction systems can lead to new, high throughput and low cost disposable devices for screening and diagnostic purposes. There are already several designs and formats enabling polymerase chain reaction (PCR), liquid chromatography or electrophoresis to be performed "on chip".

As part of my research work, I dealt with development, fabrication and implementation of the microfluidic systems and sensors for biomolecule detection. In one application, lithographically defined surface of the vacuum deposited thin metal layer was utilized for construction of the simple amalgam electrode array suitable for protein detection. The electrochemical properties of electrodes were tested with respect to their size, material, stability and sensitivity.

In another application lithographic technique was utilized to construct high aspect ratio, free-standing structures with potential bioanalytical use. Structures of various dimensions (from tenths of nanometers to microns) and shapes were prepared. Proper surface modification of particles enables molecule targeting, addressable positioning and self-assembling into directed topologies.