

ABSTRACT (EN)

Presented PhD thesis was aimed at the utilization of desorption ionization mass spectrometric techniques to study different types of biological samples.

An important part of this thesis was the construction of a universal platform for ambient ionization techniques (AIT) in mass spectrometry (MS) for the experiments performed in combination with desorption electrospray ionization (DESI) and desorption atmospheric pressure photoionization (DAPPI). Initially manual platform for AIT was during the development rebuild into a motorized platform operated by software via user interface of the mass spectrometer. Using the motorized platform it was possible to carry out a one-dimensional (1-D) and two dimensional (2-D) samples analysis with a defined step size of imaging.

Platform designed for AIT in MS was tested in DESI-MS mode by model analyte Rhodamine B and by plant samples which were represented by *Aconitum plicatum*. The platform was also tested on biological samples of vernix caseosa using DAPPI-MS ion source. Model analyte rhodamine B was in DESI-MS technique used to study the basic desorption ionization processes occurring in the DESI during the sample analysis. In order to highlight the surface structures the colloidal solution of ferrite nanoparticles was added into the sprayed liquid. For the visualization of surface structures with high resolution the scanning electron microscopy was used.

Based on the DAPPI-MS technique a new method of melamine analysis in milk and cream samples was developed.

A classic desorption ionization technique namely matrix assisted laser desorption ionization (MALDI) in combination with the imaging mass spectrometry (MSI) approach was used for studying of biological samples. The first project application of MALDI-MSI was focused on the surface analysis of *Drosophila melanogaster* flies in order to study the distribution of female's and male's pheromones. The results from MALDI-MSI of *D. melanogaster* flies were supported by analyzing of hexane flies extracts by gas chromatography. In the second MALDI-MSI project the properties of a new fixation medium based on poly[N-(2-hydroxypropyl)methacrylamide (pHPMA) were studied with respect to the making and analyzing of cryo-microtome sections of *Bombus terrestris*.