

ABSTRACT (EN)

Ambient mass spectrometry defines the versatile group of methods providing analysis of solid sample surfaces and liquids in an open atmospheric pressure environment, where the sample is simultaneously accessible to another treatment. Ambient mass spectrometry is a sharply developing research area in the analytical chemistry. It provides fast, direct analysis of objects without any sample pretreatment with the use of the mass spectrometer. Desorption electrospray ionization (DESI) and desorption atmospheric pressure photoionization (DAPPI) equipped with software control of the sample holder were investigated in this doctoral thesis. These methods use a spray of solvents for desorption and ionization molecules from solid substrate and they are suitable tools for mass spectrometry imaging (MSI) of low molecular organic compounds, where the chemical identity of molecules present on a surface is examined as a function of spatial distribution.

This project deals with applications and instrumental development. As for the applications, the position of the defense glands on insect bodies, separation of the lipids in complex mixtures on thin-layer chromatography (TLC) plates, or steroid metabolites in woman urine during pregnancy were thus investigated. As for the instrumental development, the most important point is the construction of a new ion source for ambient mass spectrometry imaging of nonplanar samples. A visible trend interwoven with the project is a progress from the planar to the nonplanar sample analysis.

KEYWORDS (EN)

ambient mass spectrometry techniques; desorption atmospheric pressure photoionization; desorption electrospray ionization; mass spectrometry imaging; insect chemical defense; exocrine glands; termite; stink bug; thin-layer chromatography; lipids; vernix caseosa; pregnancy; laser triangulation