

無機物の熱パルスイオン化

Pulse-heating ionization for inorganic material

北先大院, 高村研² ○羅 希¹, ファン チョン トウエ、高村 禪

JASIT, Takamura lab. °Xi Luo, Phan Trong Tue, Yuzuru Takamura

E-mail: L.xi@jaist.ac.jp

INTRODUCTION

A pulse-heating ion source has been established to peptides and proteins detection by only applying thermal energy from a single pulse without laser or high voltage [1]. This study concerns the generation of negative ions of simple inorganic materials such as sodium chloride with the pulse-heating on-chip ionization source. As a result, peaks corresponding to OH^- and Cl^- signals were observed in the mass spectra indicating that the sodium chloride sample was successfully ionized by the system.

EXPERIMENTAL

The miniaturized mass spectrometer system was pretreated according to the previous study and operated in the negative ion mode [1]. Sodium chloride (NaCl) was dissolved in a mixture of methanol and water ($v/v = 2:1$) with a concentration of 4 mg/mL. 300 nL of sample solution was dropped on the micro electrode and dried in a vacuum.

RESULTS AND DISCUSSION

To confirm the background signal, mass spectra of a pristine chip (without sample) and a chip with pure methanol were measured. No remarkable signals could be

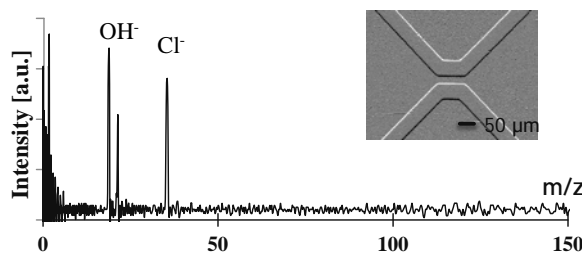


Fig.1 Negative mode mass spectra and microscopic image of NaCl

seen indicating that the background signal would be negligible. Figure 1 shows the mass spectra of NaCl sample taken by a negative mode (the inset shows an optical microscope image of the fabricated chip with the NaCl sample). As clearly seen on the surface of the ion-source chip, the NaCl sample was uniformly distributed, which is very important for obtaining reproducible high-quality mass spectra. The intense OH^- and Cl^- peaks were observed in the mass spectrum with a high signal-to-noise ratio. Furthermore, there are no undesirable signal in the high mass region of the spectrum suggesting less fragmentation from the sample ionized by this method.

CONCLUSION

The sodium chloride was ionized and detected by the on-chip ion source with negative ion mode successfully. A clear mass spectrum with only OH^- and Cl^- signals was obtained. The results indicated the possibility of accurate analysis of inorganic sample detection with single pulse on-chip ion source mass spectrometer system.

REFERENCES

[1] K. Sugiyama, et al. Analytical chemistry, 86, 7593, (2014).