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Direct Nano-electrospray ionization analysis of untreated biological samples

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Abstract

Nanoelectrospray ionization mass spectrometry (nESI-MS) is now a major approach for chemical analysis in various disciplines, including biology, medicine, chemistry, etc. However, nESI-MS analysis of untreated biological samples containing large concentrations of metal salts presents serious challenge due to the problems of the ion suppression, frequent capillary clogging and electric discharge. These problems seriously deteriorate the performance and are broadly recognized. Here we describe our approach based on the ion current limitation by high-ohmic resistor combined with polarity reversing for the online desalting and sequential molecular analysis of various untreated biological samples, such as liquid, juicy, viscous samples, including those with extremely high salt concentration, without any pretreatment. This mode of analysis has many advantages over conventional ESI, nESI and other types of MS analysis. The combination of ion current limitation with polarity reversing to overcomes the key problems of conventional nESI, such as poor stability and reproducibility, while retaining its beneficial performance characteristics, such as nanoflow rate of sample consumption (< 1 nL/min) as well as the high sensitivity of analysis. Analytical performance is demonstrated for the broad range of vapor, solid, liquid and viscous biological samples. We believe that the proposed approach may solve many current problems in nESI-MS and significantly advance direct mass spectrometry analysis of untreated biological samples.

Biography:

Konstantin Chingin received his Ph.D at ETH Zurich (2010). He was a postdoc in the group of Prof. Richard N. Zare at Stanford University (2010-2011). He was a research fellow hosted by Prof. Roman Zubarev at Karolinska Institute, Stockholm (2011-2013). He is a full professor of Analytical Chemistry at East China University of Technology (2013-present). He published more than 50 peer-reviewed publications in SCI journals including PNAS, Angew. Chem., Anal. Chem., Chem. Commun., Mol. Cell. Prot., Sci. Rep.,etc. H-index = 20. His research is mainly focused on bioanalytical mass spectrometry.

Speaker Publications:

1. "Selective Detection of Phospholipids from Human Blood Plasma and Single Cells for Cancer Differentiation using Dispersed Solid-Phase Microextraction Combined with Extractive Electrospray Ionization Mass Spectrometry"; Analyst. / 2020 / Issue 18
2. "Comparative Study of Alterations in Phospholipid Profiles upon Liver Cancer in Humans and Mice"; Desalination and Analyst. / 2020/ Issue 18
3. "Validation of Breast Cancer Margins by Tissue Spray Mass Spectrometry/ Analyst. / 2020/ Issue 18.
4. "Combination of Low-Temperature Electrosurgical Unit and Extractive Electrospray Ionization Mass Spectrometry for Molecular Profiling and Classification of Tissues/ Analyst. / 2020/ Issue 18
5. "Floral volatiles identification and molecular differentiation of Osmanthus fragrans by neutral desorption extractive atmospheric pressure chemical ionization mass spectrometry/ Analyst. / 2020/ Issue 18.

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