

SPion®: Flexible Ion Guide for Mass Spectrometry

Dr. Mazdak Taghioskoui - United States - Trace Matters

Abstract

When ions are produced far from a mass spectrometer, efficiently transferring them to the mass analyzer becomes challenging. In this presentation, I will introduce a novel technology called SPion®, a flexible ion guide based on the stacked-ring principle. SPion® enables efficient ion transport over relatively long distances, even when curved or flexed.

This flexible ion-guiding concept fundamentally changes the architecture of mass spectrometry instrumentation by removing the constraint of sample location. It allows for sample-centric analysis, where the mass spectrometer can extend to the sample, rather than bringing the sample to the mass spectrometer. This breakthrough fills a crucial gap in ambient ionization mass spectrometry and facilitates automation for high-sensitivity applications.

I will present both theoretical analysis and experimentally validated proof-of-principle demonstrations. The results show that SPion® efficiently transfers ions in both positive and negative modes, from 20 Da to several kDa. Notably, no solvent cluster ions are present in spectra obtained via electrospray ionization, and ion transfer with SPion® does not cause fragmentation. Additionally, bending or moving SPion® has no impact on ion transfer, although there is a slight drop in signal intensity compared to the original interface.

SPion® paves the way for the development of next-generation, sample-centric, high-performance peripheral technologies for mass spectrometry, including streamlined sample preparation platforms. I will also discuss some exemplary implementations of SPion®.

Biography - Mazdak Taghioskoui

Mazdak Taghioskoui is the CEO and founder of Trace Matters, with deep expertise in mass spectrometry instrumentation, particularly in platform development. He has received multiple awards for his research on miniaturized plasma sources and ambient mass spectrometry. Mazdak has led or co-led several NASA-funded R&D projects, including PICASSO and DALI, and was a 2020 winner of NASA's Science Mission Directorate Entrepreneurs Challenge for his invention of SPion®. He holds over 10 patents in mass spectrometry.

Keywords

Flexible ion guide, Ion transfer, Lossless ion transfer