Cilong Yu, J Chromatogr Sep Tech 2018, Volume 9
DOI: 10.4172/2157-7064-C1-040

Microfluidic chip-based ionization coupling with mass spectrometry

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The coupling of microfluidic chip-based ionization to mass spectrometer (MS) has recently gained considerable attention in the mass spectrometry community. In consideration of the miniaturization, integration, and universal disadvantages of microfluidic chip-based ionization coupled with MS, this study proposed three novel microfluidic ionization chips. All sources were fabricated by using the multi-layer soft lithography method. Three-dimensional (3D) flow focusing (FF)-based microfluidic ionizing source can realize two-phase FF with liquid in air regardless of the viscosity ratio of the continuous and dispersed phases. MS results indicated that the proposed FF microfluidic chip can work as a typical electrical ionization source when supplied with high voltage and can serve as a sonic ionization source without high voltage. To further improve the integration of ionization and simplified the operation of such device, the microfluidic self-aspiration sonic-spray ionization chip was fabricated. The experimental results demonstrated that the proposed microfluidic chip can implement the ionization of liquid samples depending simply on the gas applied on the sheath flow channel with much lower gas pressure. In addition, a microfluidic chip-based multi-channel ionization (MCMCI) was also developed to extend the application of microfluidic chip ionization to MS. This MCMCI implemented extraction of untreated compounds in complex matrices without sample pretreatments and dual sprays with high DC voltages simultaneously. All these microfluidic chip ionizations are expected to have various applications, particularly in the integrated and portable applications of ionization source coupling with portable MS in the future.

Biography

Cilong Yu has completed his PhD from Tsinghua University, Department of Precision Instrument. He is working as Assistant Professor at Shenzhen University, College of Mechatronics and Control Engineering. He has published several papers in reputed journals about microfluidic chip ionization.

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