JOURNAL ARTICLE

Utilizing Microchip Capillary Electrophoresis Electrospray Ionization for Hydrogen Exchange Mass Spectrometry

Published Journal Articles on Microfluidic ZipChip CE-ESI-MS
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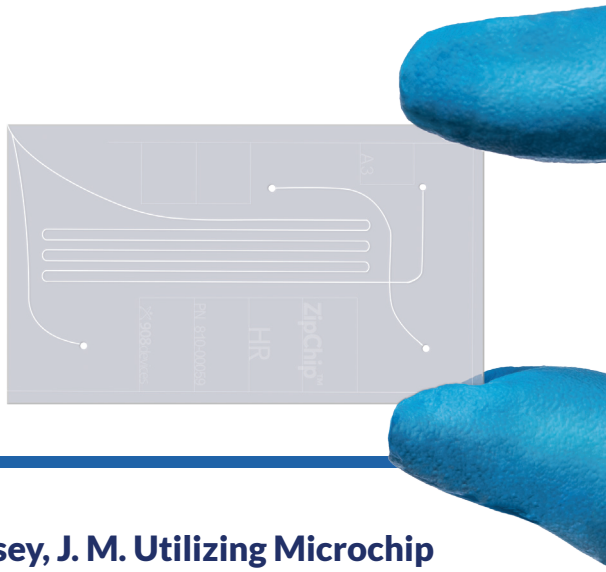
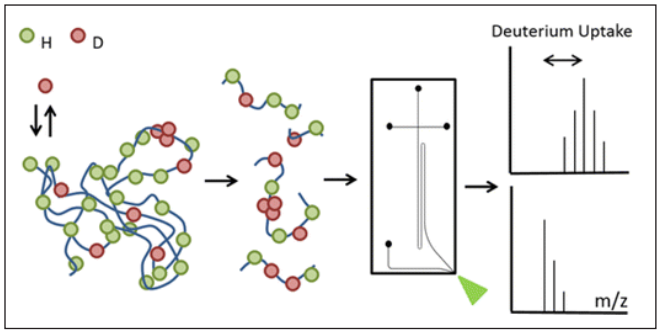


(3) Black, W. A.; Stocks, B. B.; Mellors, J. S.; Engen, J. R.; Ramsey, J. M. Utilizing Microchip Capillary Electrophoresis Electrospray Ionization for Hydrogen Exchange Mass Spectrometry. *Anal. Chem.* 2015, *86*, 3493–3500

ABSTRACT: Hydrogen exchange (HX) mass spectrometry (MS) of complex mixtures requires a fast, reproducible, and high peak capacity separation prior to MS detection. The current paradigm relies on liquid chromatography (LC) with fast gradients performed at low temperatures to minimize back exchange. Unfortunately, under these conditions, the effciency of LC is limited due to resistance to mass transfer, reducing the capability to analyze complex samples. Capillary electrophoresis (CE), on the other hand, is not limited by resistance to mass transfer, enabling very rapid separations that are not adversely affected by low temperature. Previously, we have demonstrated an integrated microfluidic device coupling CE with electrospray ionization (ESI) capable of very rapid and high effciency separations. In this work, we demonstrate the utility of this microchip CE-ESI device for HX MS. High speed CE-ESI of a bovine hemoglobin pepsin digestion was performed in 1 min with a peak capacity of 62 versus a similar LC separation performed in 7 min with peak capacity of 31. A room temperature CE method performed in 1.25 min provided similar deuterium retention as an 8.5 min LC method conducted at 0 °C. Separation of a complex mixture with CE was done with considerably better speed and nearly triple the peak capacity than the equivalent separation by LC. Overall, the results indicate the potential utility of microchip CE-ESI for HX MS.



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