

Towards better insights and improved performance of sheath-flow assisted ESI-MS interface in capillary electrophoresis

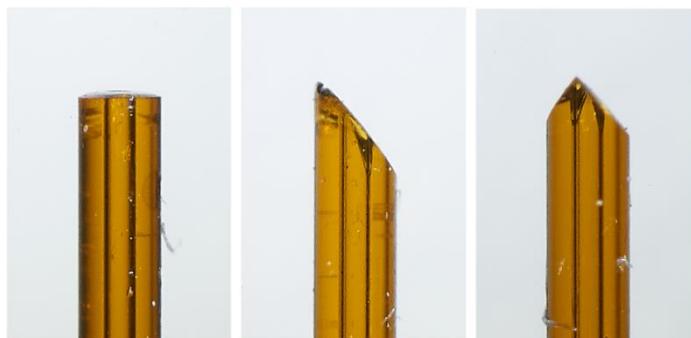
B. R. Rudisch*, S. Knoll, C. Knappe, C. Huhn

Institute for Physical and Theoretical Chemistry, University of Tübingen, Auf der Morgenstelle 18, 72076 Tübingen

* benjamin.rudisch@uni-tuebingen.de

Coupling CE to ESI-MS is a challenging task with current instrumentation optimized for liquid chromatography. This is due the low flow rates of CE, the limited choice of background electrolytes being MS compatible and the need to close the electric circuits of both CE and electrospray.^[1] Over the past decades, various interface designs have been published to address these issues, of which only a few are commercially available today. Electro-spray ionisation (ESI) interfaces for CE can be divided into sheath-flow assisted and sheath-less interfaces. While nowadays the research focus is on sheath-less nanoESI interfaces which promise higher ionization efficiencies and lower limits of detection, setups are often self-made, sophisticated and require tip-preparation steps involving etching with hydrofluoric acid.^[2] In contrast, sheath liquid interfaces applied in routine analysis provide higher robustness.

The aim of our research presented here is to better understand the electrospray generation in the commercial sheath liquid CE-ESI-MS interface. Different capillary tip-shapes were produced using a simple, efficient and robust protocol employing abrasive and polishing paper with the capillary mounted on a home-made device to control the angle for polishing: flat, 45° from one side, and 45° from two sides. Acidic and nonaqueous background electrolytes were applied in model systems. We investigated the influence of the tip-shape and key MS parameters such as sheath-flow rate, nebulizer pressure and capillary voltage. Detailed images and videos of the emitter tip allow for a visual examination of the active electrospray and to improve our understanding of the parameter's interaction. Results show different electrospray modes for the different tip-shapes up to multiple emitter sprays as well as an improved electrospray stability. Ultimately this should lead to an optimised protocol for tip-emitter preparation and installation with optimized MS parameters.



[1] G. Bonvin, J. Schappler, S. Rudaz, *J. Chromatogr. A*, **2012**, 1267, pp 17-31.

[2] M. Moini, *Anal. Chem.*, **2007**, 79, pp 4241–4246.