

## Spray Chamber Optimization for the Coupling of CE to ICP-MS

Björn Meermann, Andy Scheffer, Marc Bartel, Martin Vogel and Uwe Karst

University of Münster, Institute of Inorganic and Analytical Chemistry, Corrensstraße 30,  
48149 Münster, Germany

In analytical chemistry, speciation analysis has steadily gained more importance in recent years. This is mainly due to the fact that relevant information about a sample, e.g. toxicity, degree of contamination etc., can only be obtained if individual species of one element are determined. The coupling of inductively coupled plasma mass spectrometry (ICP-MS) with separation systems such as liquid chromatography (LC), gas chromatography (GC) or capillary electrophoresis (CE) allows both the selective and sensitive analysis of element species.

In 1995, Olesik et al. [1] reported on the first interface for the coupling of CE to ICP-MS. However, the applicability of this interface was only limited as the pneumatic nebulizer dealt with a laminar flow. In order to overcome this limitation, another nebulizer has been developed by Prange et al. in 1998 [2]. Currently, two nebulizer systems are commercially available: a concentric nebulizer from Cetac, and a parallel-path nebulizer from Brugener Mira.

In this work, the parallel-path nebulizer has been used in combination with different spray-chamber designs, all of which are home-made. We used an micro cyclone spray chamber and axially spray chambers optionally with an tangential gas flow. The spray chambers have been investigated and optimized regarding nebulizer-gas pressures, flow rates and sheath-flow influences. For the characterization of each spray chamber, we show the  $Mg^+$ ,  $Pb^+$ ,  $In^+$ ,  $[CeO]^+$ , and  $Ce^{2+}$  signal traces. Furthermore, the separation of cobaltocinium salts by CE coupled to ICP-MS with an optimized interface design has been investigated.

To compare the results obtained with the home-made spray chambers, a commercially available spray chamber has been used in combination with the concentric nebulizer from Cetac

### References:

- [1] B. Michalke, *Electrophoresis*, 26 (2005) 1584-1597.
- [2] A. Prange, D. Schaumlöffel, D. Vorrichtung zur Kopplung einer Kapillarelektro-phoreseeinrichtung mit einer Plasma-Massen-Spektrometereinrichtung, Patent No. DE19841288C2, Publication Date 1998, September 09.