

# PL2610: List of key publications on the characterization of nanoparticles by FFF-MALS coupled to ICP-MS

## Summary

This document lists key publications using AF4-MALS-coupled to ICP-MS for the characterization of nanoparticles in environmental and related applications. The selected publications introduce new concepts or important methods for this technique.

### Characterization of nanoparticles: methodology, validation and cross-comparisons

- Quantification and size characterization of silver nanoparticles in environmental aqueous samples and consumer products by single particle-ICPMS. \*

Aznar, R. et al., *Talanta* **175**(1), 200-208 (2017)  
DOI: 10.1016/j.talanta.2017.07.048

- Application of an asymmetric flow field flow fractionation multi-detector approach for metallic engineered nanoparticle characterization – Prospects and limitations demonstrated on Au nanoparticles. †

Hagendorfer, H. et al., *Analytica Chimica Acta* **706**(2), 367-378 (2011)  
DOI: 10.1016/j.aca.2011.08.014

- On-line and off-line quantification of trace elements associated to colloids by As-Fi-FFF and ICP-MS. ‡  
  
Dubascoux, S. et al., *Talanta* **77**(1), 60–65 (2008)  
DOI: 10.1016/j.talanta.2008.05.050
- Critical aspects of sample handling for direct nanoparticle analysis and analytical challenges using asymmetric field flow fractionation in a multi-detector approach. †  
  
Ulrich, A. et al., *J. Anal. At. Spectrom.* **27**, 1120-1130 (2012)  
DOI: 10.1039/c2ja30024a
- Optimization and evaluation of asymmetric flow field flow fractionation of silver nanoparticles. ‡  
  
Loeschner, K. et al., *J. Chromatog. A* **1272**, 116-125 (2013)  
DOI: 10.1016/j.chroma.2012.11.053
- Differentiation and characterization of isotopically modified silver nanoparticles in aqueous media using asymmetric flow field flow fractionation coupled to optical detection and mass spectrometry. ‡  
  
Gigault, J. et al. *Analytica Chimica Acta* **763**(6), 57-66 (2012)  
DOI: 10.1016/j.aca.2012.11.060

- Simultaneous Determination of Size and Quantification of Silica Nanoparticles by Asymmetric Flow Field-Flow Fractionation Coupled to ICPMS Using Silica Nanoparticles Standards. ‡  
 Barahona, F. et al., *J. Anal. Chem.* **87**(5), 3039-3047 (2015)  
 DOI: 10.1021/ac504698j
- Fraction-related quantification of silver nanoparticles via on-line species-unspecific post-channel isotope dilution in combination with asymmetric flow-field-flow fractionation (AF4)/sector field ICP-mass spectrometry (ICP-SF-MS). ‡  
 Meermann, B. et al., *J. Anal. At. Spectrom.* **29**, 287-296 (2014)  
 DOI: 10.1039/c3ja50179e
- Physicochemical characterization of titanium dioxide pigments using various techniques for size determination and asymmetric flow field flow fractionation hyphenated with inductively coupled plasma mass spectrometry. †  
 Helsper, J.P.F.G. et al., *Anal. Bioanaly. Chem.* **408**(24), 6679-6691 (2016)  
 DOI: 10.1007/s00216-016-9783-6
- Investigation of uranium–colloid interactions in soil by dual field-flow fractionation/capillary electrophoresis hyphenated with inductively coupled plasma-mass spectrometry. ‡  
 Claveranne-Lamolère, C. et al., *Talanta* **85**(5), 2504– 2510 (2011)  
 DOI: 10.1016/j.talanta.2011.07.100
- Anoxia-Induced Release of Colloid- and Nanoparticle-Bound Phosphorus in Grassland Soils. \*  
 Henderson, R. et al, *Environ. Sci. Technol.* **46** (21), 11727–11734 (2012)  
 DOI: 10.1021/es302395r
- Asymmetrical flow-field-flow fractionation coupled with inductively coupled plasma mass spectrometry for the analysis of gold nanoparticles in the presence of natural nanoparticles. ‡  
 Meisterjahn, B. et al. *J. Chromatog. A* **1372**, 204-211 (2102)  
 DOI: 10.1016/j.chroma.2014.10.093
- Optimization of flow field-flow fractionation for the characterization of natural colloids. ‡  
 El Hadri, H. et al. *Anal. Bioanaly. Chem.* **406** (6), 1639-49 (2014)  
 DOI: 10.1007/s00216-013-7369-0
- Influence of soil porewater properties on the fate and toxicity of silver nanoparticles to *Cae-norhabditis elegans*. ‡  
 Schultz, C.L. et al. *Environ Toxicol Chem* **37**(10), 2609-2618 (2018)  
 DOI: 10.1002/etc.4220

## Nanoparticles in inorganic matrices

- Colloidal transport of uranium in soil: size fractionation and characterization by field-flow fractionation–multi-detection. ‡  
 Claveranne-Lamolère, C. et al. *J. Chromat. A* **1216**(52), 9113-9119 (2009)  
 DOI: 10.1016/j.chroma.2009.08.025

- Dispersion of natural nanomaterials in surface waters for better characterization of their physicochemical properties by AF4-ICP-MS-TEM.

Loosli, F., et al., *Sci Total Environ* **682**, 663-672 (2019)

DOI: 10.1016/j.scitotenv.2019.05.206

### Food and consumer products

- ICP-MS based methods to characterize nanoparticles of TiO<sub>2</sub> and ZnO in sunscreens with focus on regulatory and safety issues. †

Bocca, B. et al., *Sci. Tot. Environ* **630**, 922-930 (2018)

DOI: 10.1016/j.scitotenv.2018.02.166

- Production of reference materials for the detection and size determination of silica nanoparticles in tomato soup. ‡

Grombe, R. et al., *Anal. Bioanaly. Chem.* **406** (16), 3895-907 (2014)

DOI: <https://doi.org/10.1007/s00216-013-7554-1>

- Detection and characterization of silver nanoparticles in chicken meat by asymmetric flow field flow fractionation with detection by conventional or single particle ICP-MS. ‡

Loeschner, K. et al. *Anal Bioanaly. Chem* **405** (25), 8185-95 (2014)

DOI: 10.1007/s00216-013-7228-z

- Combining asymmetrical flow field-flow fractionation with light-scattering and inductively coupled plasma mass spectrometric detection for characterization of nanoclay used in biopolymer nanocomposites. \*

Schmidt, B., et al., *Food Additives and Contaminants*, **26**(12), 1619-1627 (2009)

DOI: 10.1080/02652030903225740

- Quantitative HPLC-ICP-MS analysis of antimony redox speciation in complex sample matrices: new insights into the Sb-chemistry causing poor chromatographic recoveries. ‡

Hansen, C., et al., *Analyst*, **136**, 996-1002 (2011)

DOI: 10.1039/c0an00796j

\* Wyatt Eclipse + Perkin Elmer ICP-MS

† Wyatt Eclipse + Thermo ICP-MS

‡ Wyatt Eclipse + Agilent ICP-MS



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