Since millennia, research about emerging contaminants and issues about water, soil or air contamination have been around. EPotential contaminants remain "emerging" as long as there is a scarcity of knowledge about their behavior in the environment or on their toxic effects on human health.

During our current decade, the attention for emerging contaminants is attracted by the smallest (nano)particles which are often engineered, metallic nanomaterials [1], and plastics; possibly recycled or degraded as micro or nano-plastics. By linking analytical research with inductively coupled plasma mass spectrometry (ICP-MS) to recent emerging contaminants; bottlenecks are often the related validations and quality criteria.

Various niche applications will be presented:

- The determination of engineered nanoparticles and their derivatives, especially nano-silver, in different types of water: ICP-MS is applied as key analytical technique while different approaches like total quantification by ICPMS, single particle (sp)-ICP-MS or hyphenated to separation techniques like asymmetric flow field flow fractionation (AF4) are exploited as well as other relevant complementary techniques [2,3,4].

- In monitoring studies of heavy metals in surface water, the sampling steps as well as the sample conservation (by acidification) and the sample pretreatment (by filtration) are of great influence on the achievable results. These effects are studied more closely and the most significant differences are found for the metals zinc and copper [4,5].

- Plastic seems to be the most urgent contaminant at this moment; Recycling shows an enormous added value in the circular economy. The measurement of complex material compositions in challenging recycling processes and the robust processing of the resulting data in operationally relevant information create valuable importance in the product loop of recycling. During the production of polymers and during recycling processes, pigments can be added for different purposes, e.g. as coloring agent of the polymeric product but also as tracer for tracking process development and control in the final recyclates versus possible by-products. An analytical method for tracking the pigment Solvent Blue 15 in input materials, in intermediates as well as in recycled polyethylene is developed by tracing and
quantifying an indicator metal. First test results on relevant process samples from a field-lab circular plastics were analysed and the results will be discussed [6].

References


