ENVIRONMENTAL CHEMISTRY: CHALLENGES AND POSSIBLE IMPACT OF ELEMENTS AND SMALLEST PARTICLES. **Petra Krystek,** Deltares, Utrecht, The Netherlands. (petra.krystek@deltares.nl)

Especially in the last decade, the energy transition towards renewable energies and sustainable processes is growing enormously. Currently, renewable energy resources by solar and wind are dominating. Having a closer look to the materials used in renewable energy technologies, then especially metals and elements as well as the so-called ‘technology critical elements' stand out. Within case studies, photovoltaic solar materials were investigated more closely under various environmental circumstances. New insights were gathered by time-dependent leaching experiments followed by inductively coupled plasma mass spectrometry (ICP-MS) analysis. For the total materials characterization, a non-destructive technique like instrumental neutron instrumental neutron activation analysis has advantages. Challenges in the methodological set-up like possible contaminations and the toxicity of the related elements and metals will be discussed. In environmental analysis, progressive approaches are needed for studying emerging contaminants, such as engineered, inorganic nanomaterials. By linking ICP-MS research, bottlenecks are often the related validations of complete methods and quality criteria while aspects like reliability and reproducibility become more relevant. Workflows often start with sample pretreatments in the laboratory followed by instrumental analysis for the identification and/or detection of nanoparticles. Especially for the ultra-trace analysis of nanomaterials in environmental matrices, the sampling is of the utmost importance in analytical workflows. The sampling is often underexposed and possible errors at these steps influence the validity of final results. Within this presentation, a special focus will be laid on sampling strategies of nanoparticle analysis for various types of water samples in the complete water cycle.