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Interactive spICP-MS data treatment using Nanocount

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Interest in applying single particle ICP-MS (spICP-MS) in risk assessment of inorganic engineered nanomaterials (ENM) has been increasing because it is currently the only technique capable of measuring number-based particle size distributions of ENM at the likely low number concentrations in complex environments. However, the cumbersome treatment of large spICP-MS datasets slows the widespread adoption of spICP-MS. NanocountÂ©, furthers this adoption by accepting data from any ICP-MS so that it can interactively be calculated into particle size distributions. The capabilities to correct for drift and to distinguish dissolved and nanopartiuclate signals are demonstrated using non-ideal data of 15 nm Au NPs and FAST spICP-MS data of Ag ENM in wastewater treatment sludges. It is shown how more advanced data-treatment algorithms such as deconvolution are required to measure the lowest sizes possible where considerable overlap between dissolved and particulate signals exists. Moreover, the existence of many different data-treatment algorithms such as n x sigma, K-means clustering, deconvolution and FAST spICP-MS as well as different representations of the final particle size distribution can lead to widely different results. It is thus argued here that a large portion of the variability in spICP-MS results can be explained by differences in data treatment.

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