The ability to detect and characterize nanomaterials in environmental media is obstructed by the small size of these materials (1-100nm), the low overall mass concentration expected in the environment (ng L^{-1}), and the abundance of background particles. In order to study these materials in the natural environment and to understand their impact, existing sample preparation and analytical techniques must be improved and new methods developed to track these particles in complicated systems. To this end, ICP-MS has been championed for its excellent detection limit and elemental specificity in addition to its versatility in being coupled to other techniques to improve its analytical capabilities. Some of the most promising techniques are asymmetrical flow field-flow fraction (AF4) ICP-MS, sedimentation FFF (SdFFF), and single particle spICPMS-MS. Collectively these methods can provide size, composition, and concentration for aqueous samples of nanoparticles. The presentation will highlight the current state-of-the-science and propose new directions for advancing nanomaterials characterization in environmental media.