analytical chemistry

Addition/Correction

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Correction to Determining Transport Efficiency for the Purpose of Counting and Sizing Nanoparticles via Single Particle Inductively Coupled Plasma Mass Spectrometry

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Two errors occur in eq 3, which is also presented as part of Figure 1. As published, eq 3 is

$$m_p = f_a^{-1}\left[\frac{((I_P - I_{Bgd})\eta_i) - b}{m}\right]$$

The corrected equation should be

$$m_p = f_a^{-1}\left[\frac{((I_P - I_{Bgd})/\eta_i)}{m}\right]$$

The signal intensity arising from the nanoparticle $(I_p - I_{Bgd})$ should be divided by the ionization efficiency, not multiplied. For the particles examined in this study (Au, Ag), we believe it correct to assume that $\eta_i = 1$. Therefore, this error does not affect the particle size measurements reported in the article.

In the original equation, the intercept of the dissolved standards calibration curve (b) is subtracted from the background corrected signal. If the blank used for calibration is free of dissolved Ag, then this signal arises from some level of instrumental noise. If we assume that this noise is also present during sample analysis, then the value of b is already present in I_{Bgd}, where I_{Bgd} is equal to the signal noise b plus the signal due to dissolved Ag (I_{Diss}). Since the value of b was very small in our experiments, again the reported results are minimally affected. However, for some elements or matrixes, b may be higher and contribute more to I_{Bgd} in the sample. A corrected Figure 1 is below.

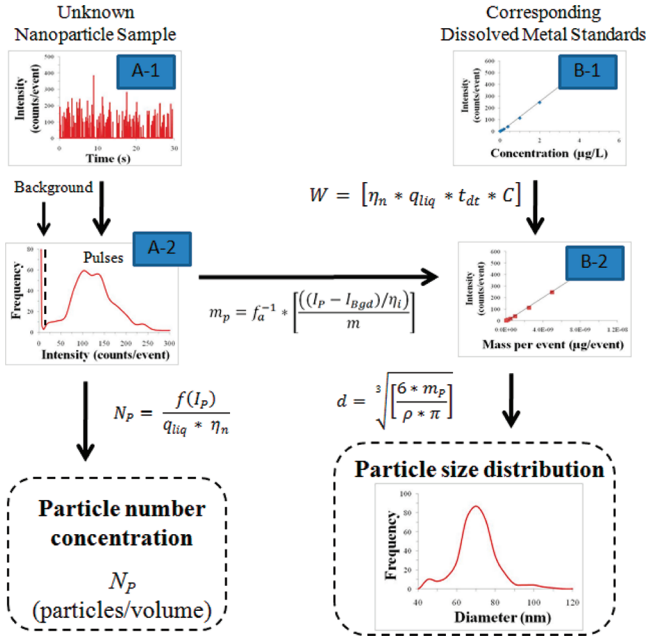

Figure 1. Data processing schematic for counting (path A) and sizing (paths A and B) nanoparticles using single particle inductively coupled plasma mass spectrometry (ICPMS). (A-1) Raw data of unknown sample, (A-2) sorted and binned raw data to separate pulses from the background, (B-1) calibration curve of dissolved standards created for particle size calculation, (B-2) transformed calibration curve from intensity vs concentration to intensity vs mass per event. Particle number concentration is determined by dividing the frequency of pulse events $(f(I_p))$ by the sample flow rate times (q_{liq}) times the transport efficiency (η_n). Particle mass (m_p) is calculated by inserting individual pulse intensities (I_p) minus the average background intensity (I_{Bgd}) into the transformed calibration curve $(y = mx + b)$. If applicable, the ionization efficiency (η_i) and the mass fraction (f_a^{-1}) of the particle are included. Conversion of the particle mass to the particle diameter and binning the data creates a particle size distribution.

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