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Research article

A guide to investigating colloidal nanoparticles by cryogenic transmission electron microscopy: pitfalls and benefits

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Supplementary information

Dynamic light scattering—Calculations

The field auto-correlation function $g_1(t)$ from uniform particles follows a negative exponential trend as a function of time (R. Pecora, *Dynamic Light Scattering: Applications of Photon Correlation Spectroscopy*, Plenum Press, New York, 1985):

$$g_1(t) = e^{-\Gamma_T t}, \quad (1)$$

where Γ_T is the relaxation time corresponding to translational Brownian motion of the suspended particle. The relaxation time is a function of particle size:

$$\Gamma_T = q^2 \frac{k_B T}{6\pi\eta} \frac{1}{R}, \quad (2)$$

where R is the hydrodynamic radius, k_B the Boltzmann constant, T the temperature, η the viscosity of the solvent, q the momentum transfer $q = \frac{4\pi}{\lambda} n \sin\left(\frac{\theta}{2}\right)$, θ the scattering angle, λ the wavelength of the laser, and n the refractive index of the solution. Equation 1 can be extended for polydisperse particles, by considering that in a given sample each particle contributes to the scattering intensity, depending on its size. The intensity-weighted correlation function then can be approximated as

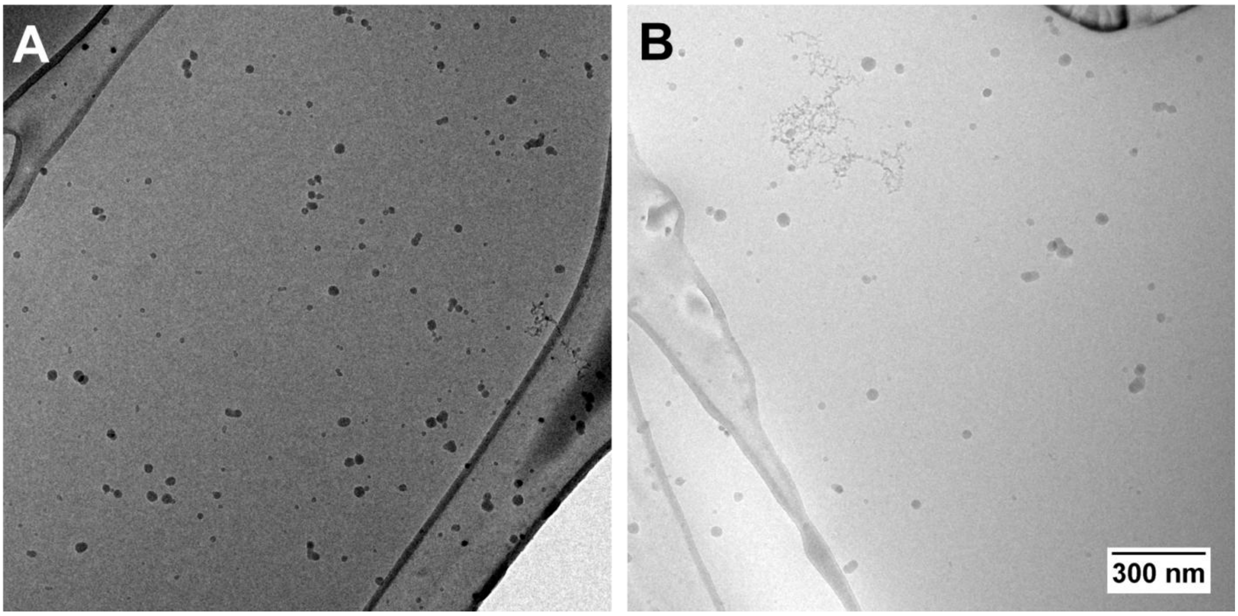
$$g_1(t) \cong \frac{\sum_{j=1}^{N} V_j^{\,2}\, g_{1_j}(t)}{\sum_{j=1}^{N} V_j^{\,2}} \qquad (3)$$

where

$$V_j = \frac{4\,\pi}{3}\, R_j^{\,3} \qquad (4)$$

is the volume of the j^{th} particle, and $g_{1_j}(t)$ the correlation function (Equation 1) corresponding to the size of this particle (Equation 2), and N is the number of counted particles.

Ice—a common artefact found in cryo-TEM



Suppl. Figure 1. Ice contaminants are constant acquaintances in cryo-TEM. Depending on the sample mounting procedure or the surroundings (*e.g.* humidity), water can freeze on the vitreous layer. Some classic appearances are shown in A/B. Ethane contamination from the plunge-freezing process may also be found (B, upper left).