Direct observation of nanoparticle dynamics in liquid by graphene liquid cell transmission electron microscopy

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Understanding motions of nanometer-sized particles in the liquid environment is not only of fundamental interest but also related to various potential applications, such as delivering drugs and controlling diffusion of molecules in a cellular environment. Here, we observed the dynamics of sub-4-nanometer nanoparticles in aqueous environment by using graphene liquid cell transmission electron microscopy. The nanocrystals show normal diffusion with strongly damped diffusivity without size dependency. Non-Gaussian displacement distribution of particles indicates the localization of solvent molecules confined between two sheets of graphene. We hope that graphene liquid cell TEM will provide more direct understanding of the dynamics of particles and solvent molecules in confined environment