Motivation: Self-assembly of nanoparticles in two dimensions is of broad scientific interest. The key factor that controls the self assembly process is the interaction between the particles. At the same time, the mobility of the particles is also important so that the system can evolve toward the thermodynamically favored ordered structure. The inter-particle interaction can be tuned by adjusting environmental chemical conditions. We will utilize a substrate-supported lipid monolayer to give mono-dispersed virus particles in-plane mobility. X-ray scattering can be used to characterize both the inter-particle interaction and the structure of the assembly.

Conclusion and significance: We have demonstrated a method to use substrate-supported lipid monolayer to facilitate 2D assembly of nanoparticles. We have also demonstrated the use of X-ray scattering to not only qualitatively characterize the ordering within the assembled structure, but also quantify the nature of the inter-particle interaction, which ultimately determines the structural order that can be achieved.

Structure and interaction in 2D assemblies of tobacco mosaic viruses

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