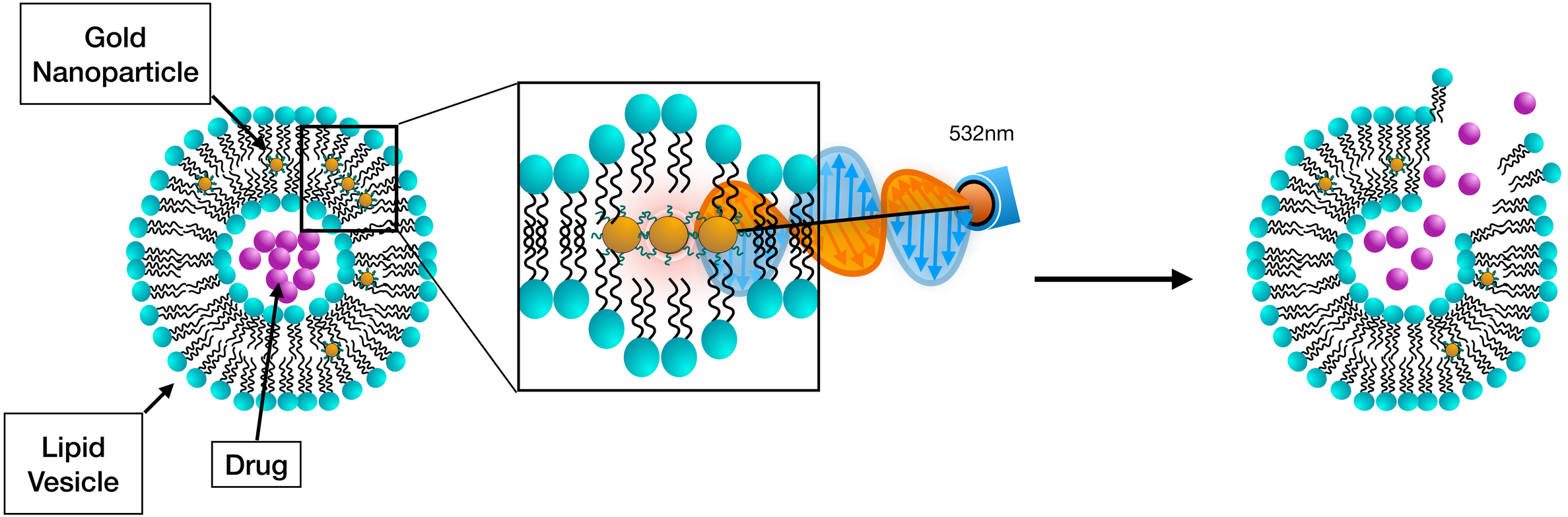
Membrane Consortium Update 2/7/23

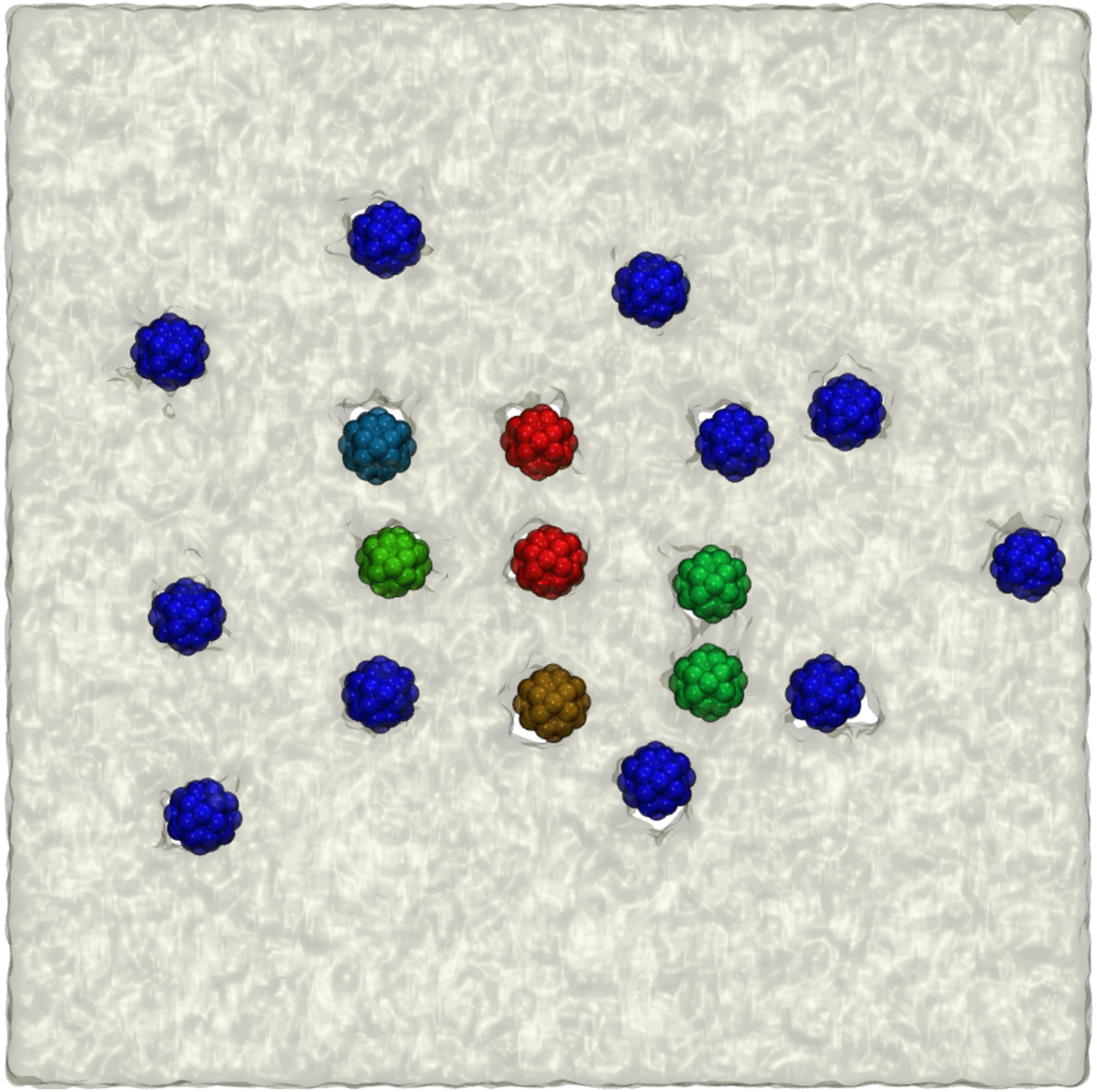
Jahmal Ennis

Irradiating gold nanoparticles in vesicles causes release of vesicle contents

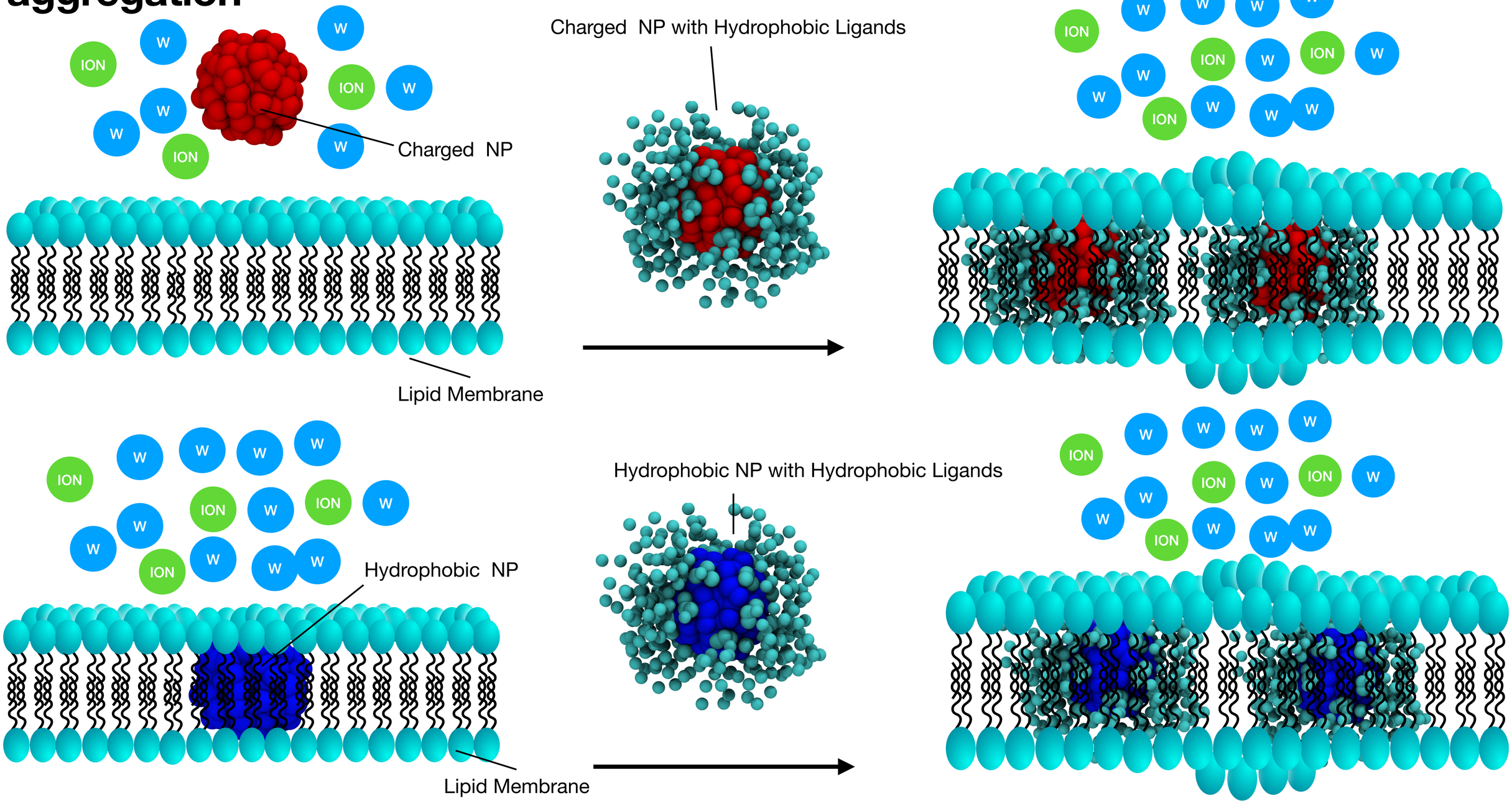
Targeted Drug Delivery



Gold nanoparticles aggregation may interfere with the rupture mechanism

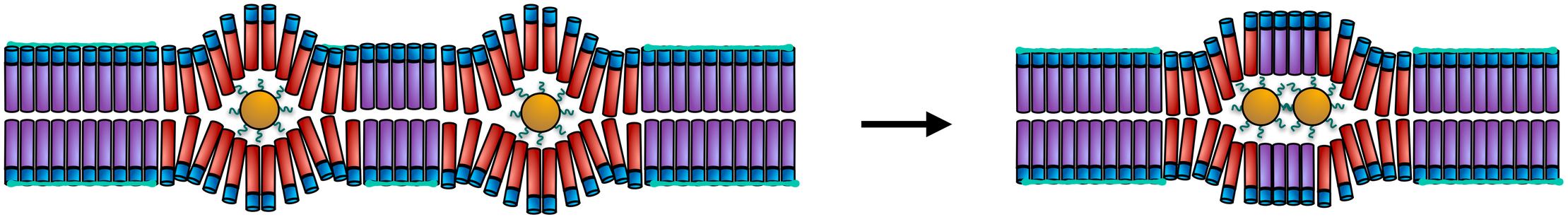


Using hydrophobic nanoparticles to understand non-charged contributions to aggregation

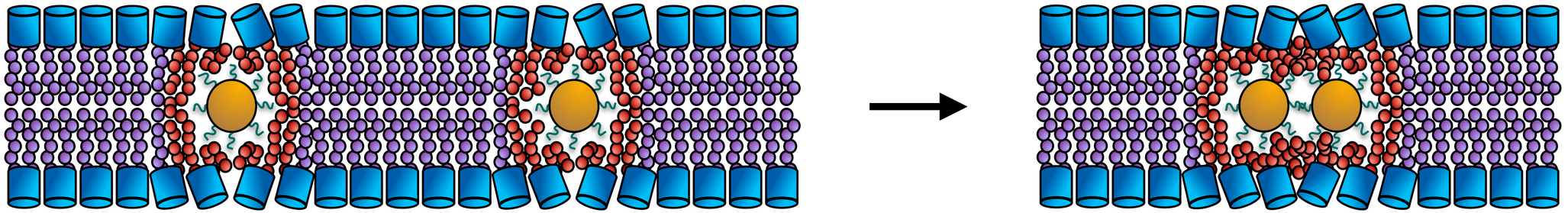


What is the primary mechanism of GNP aggregation?

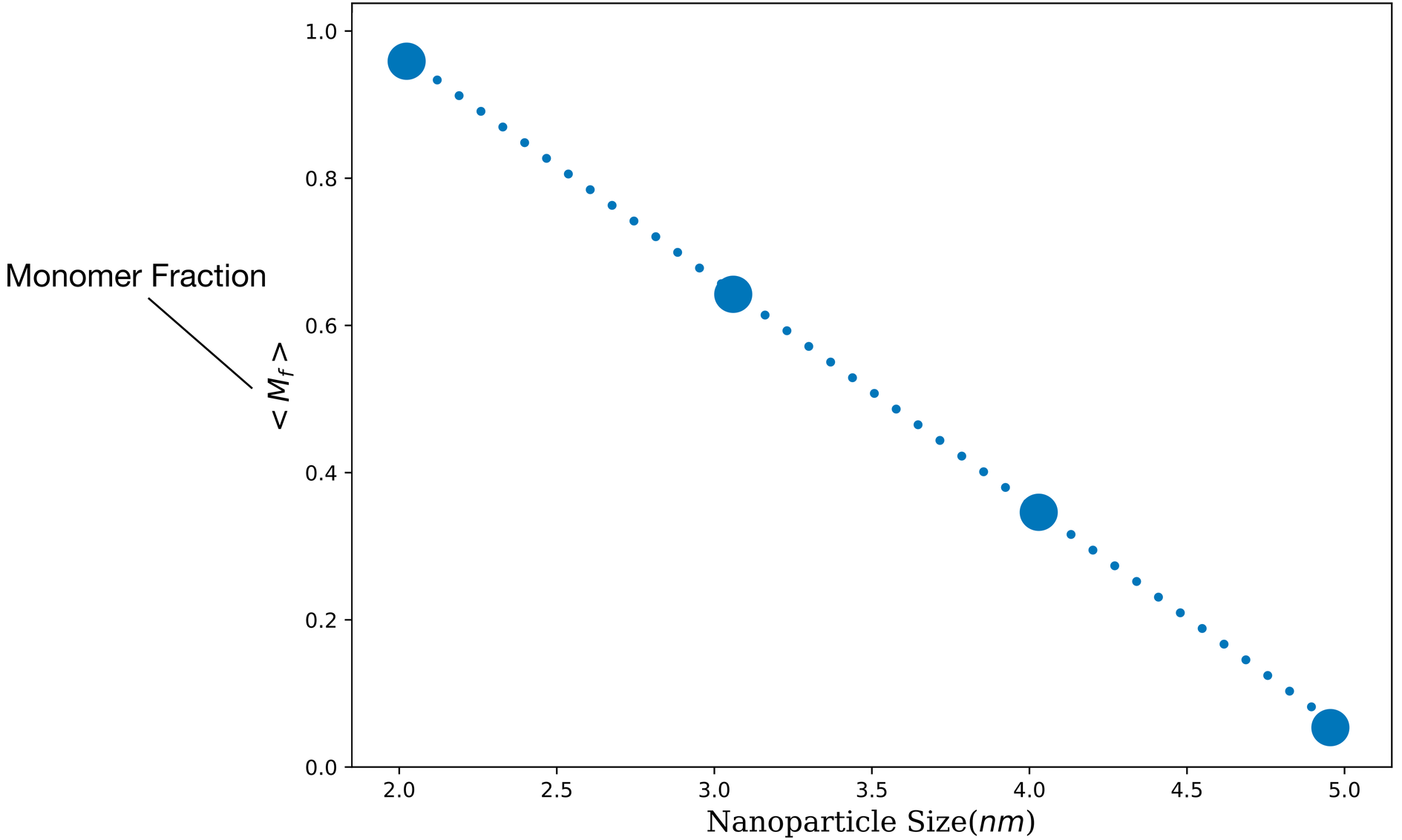
Elastic Deformation

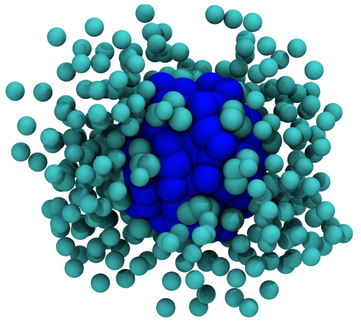


Microscopic Deformation



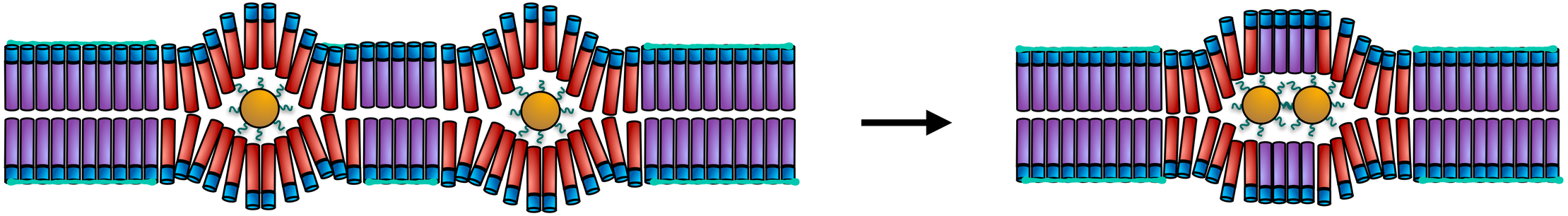
Monomer fraction does not show correlation with nanoparticle size



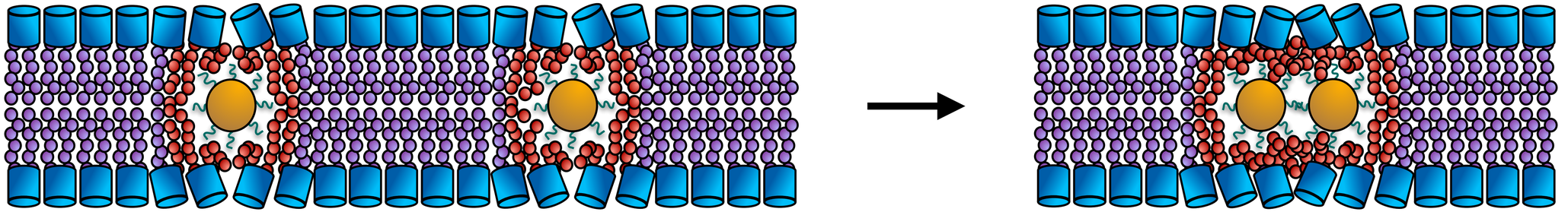


Which Mechanism Causes Aggregation?

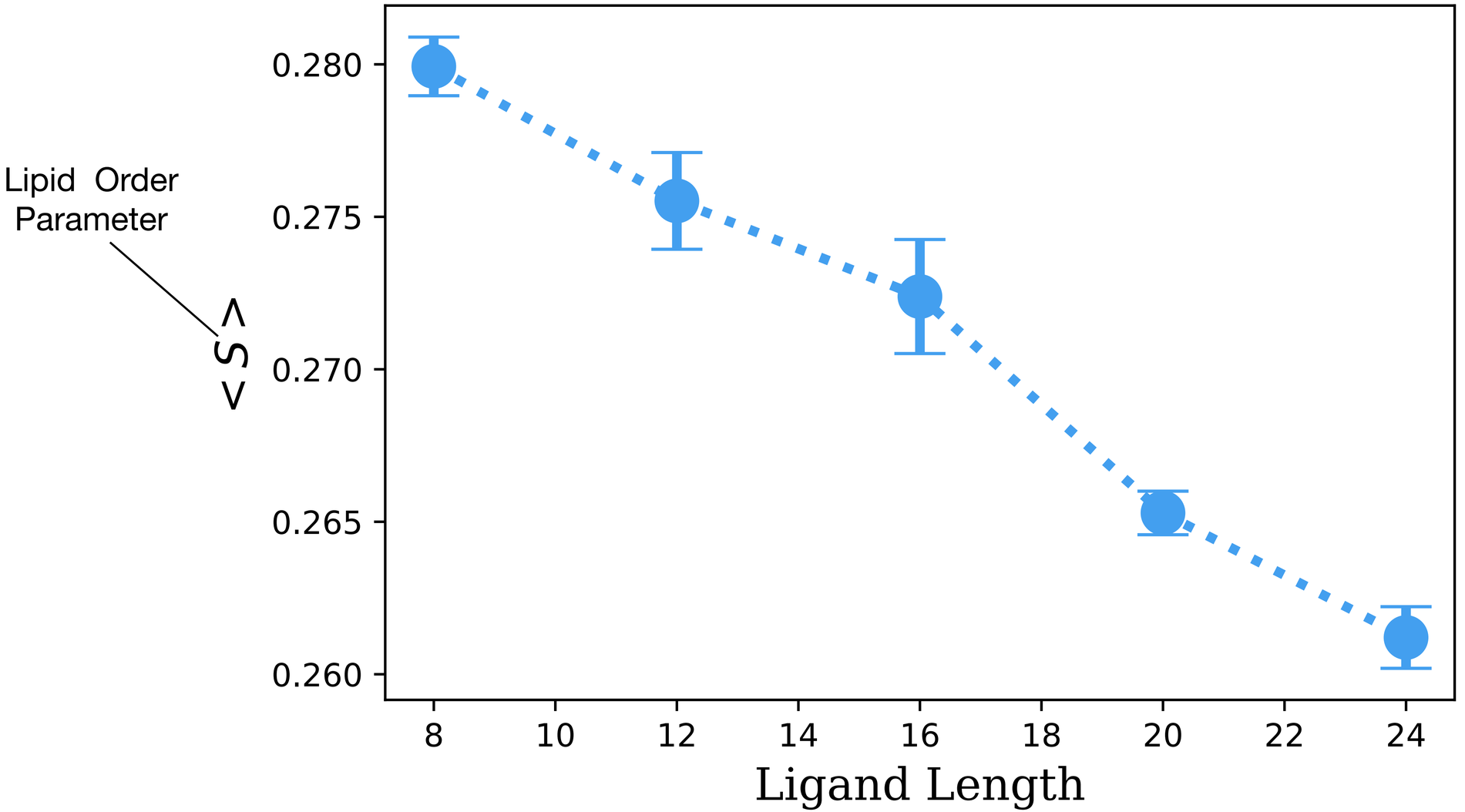
Elastic Deformation

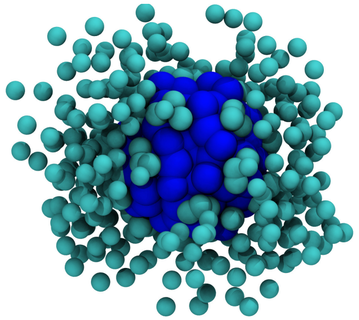


Microscopic Deformation



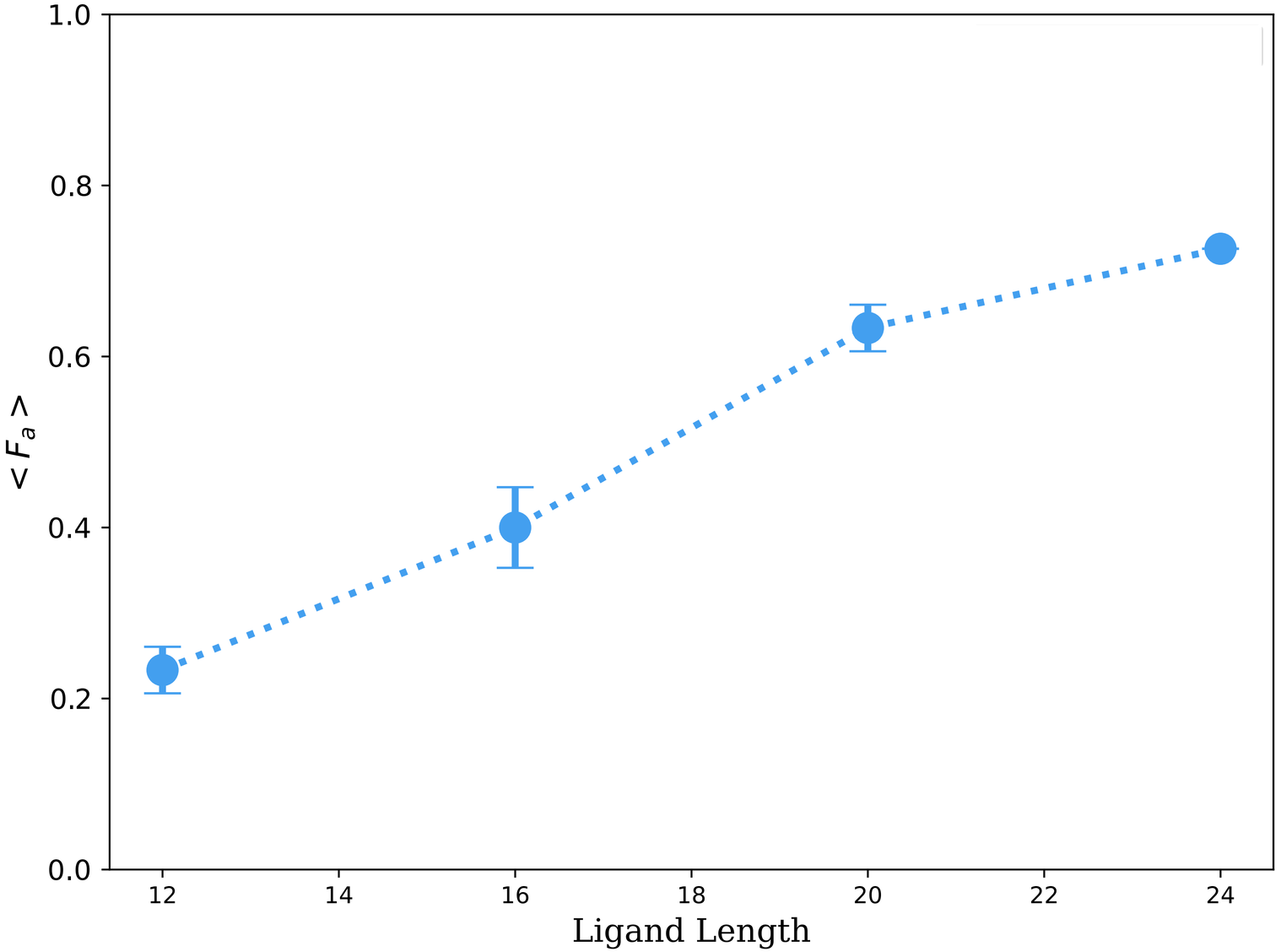
Lipid order decrease monotonically with ligand length

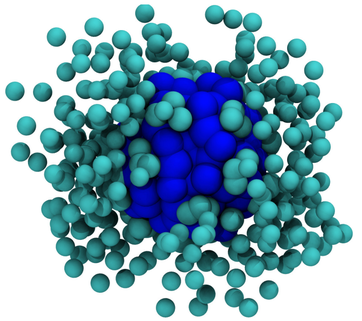




The fraction of nanoparticles in the largest aggregate has a positive monotonic relationship with ligand length

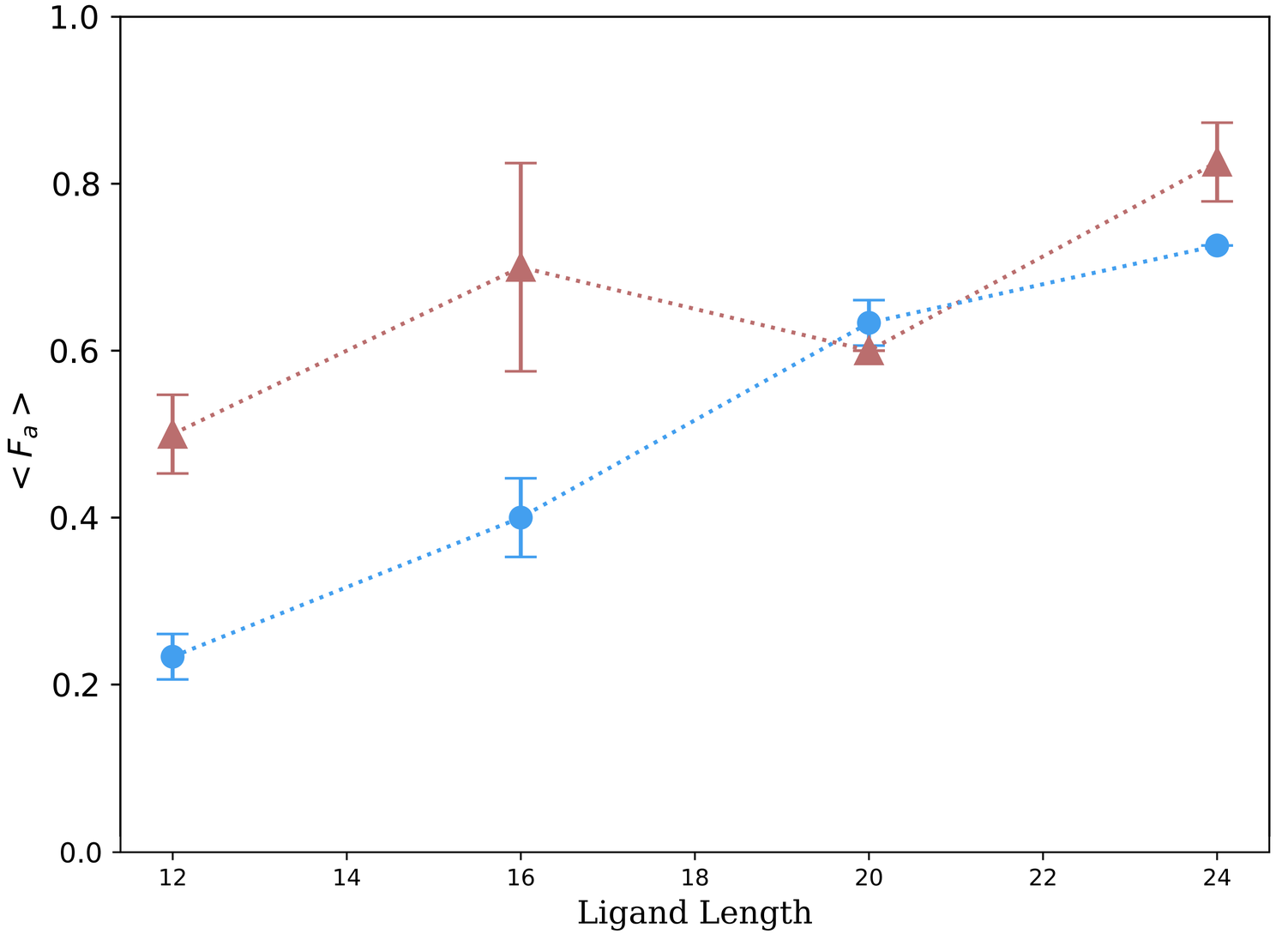
Fraction of NP's
In the
largest aggregate

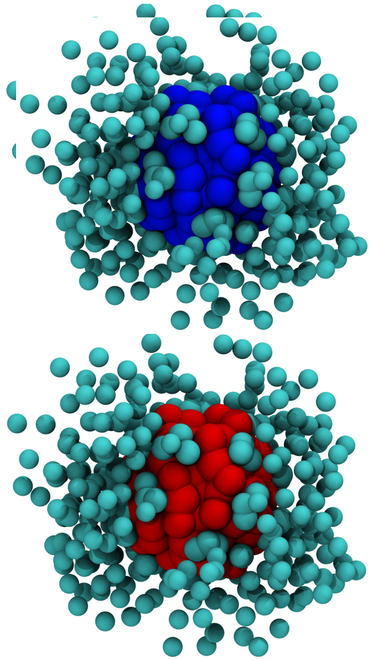


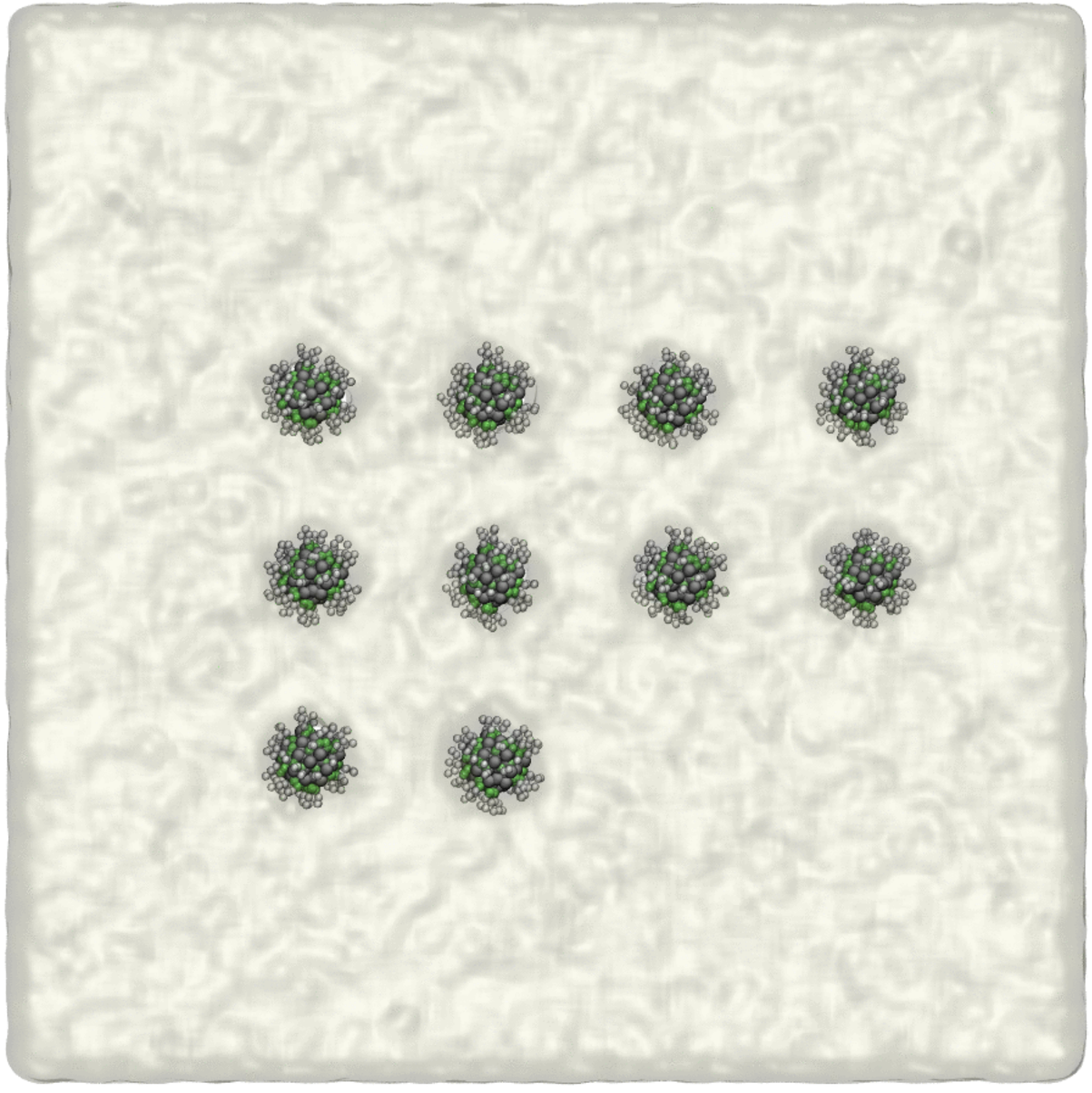


Charged nanoparticles do not show a trend between the fraction of aggregates in the largest aggregate and ligand length

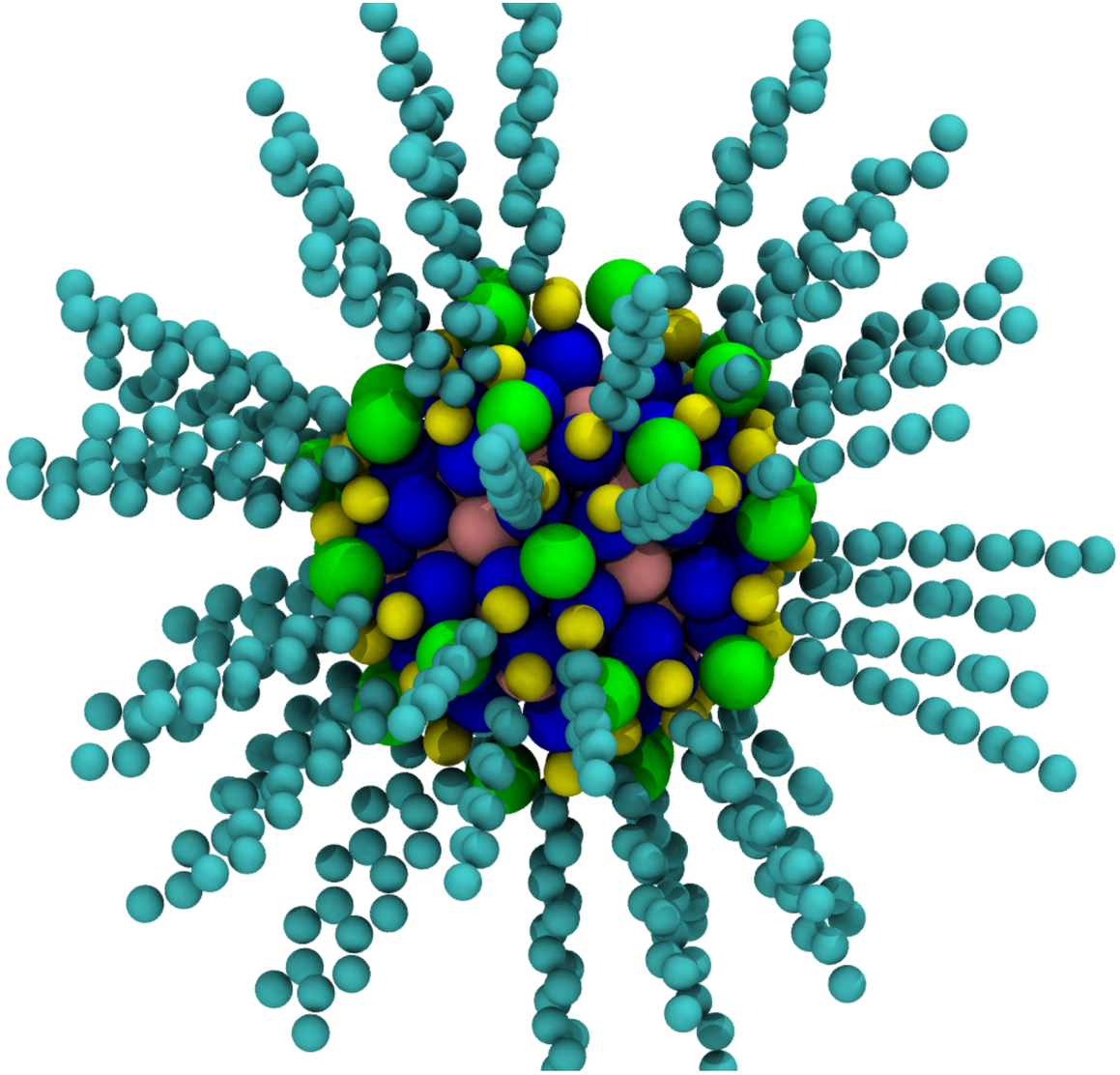
Fraction of NP's
In the
largest aggregate



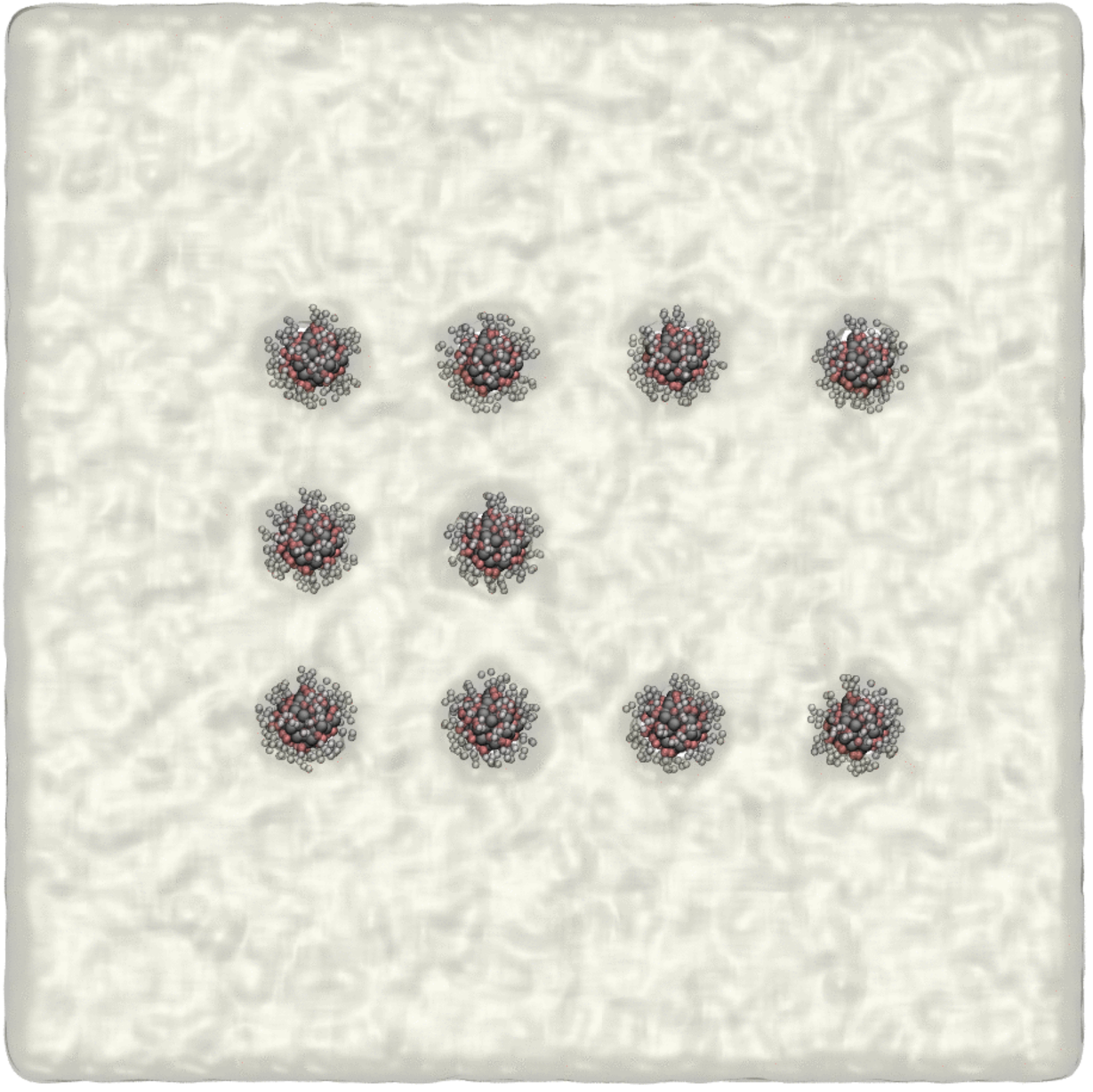




How does aggregation depend on nanoparticle charge?

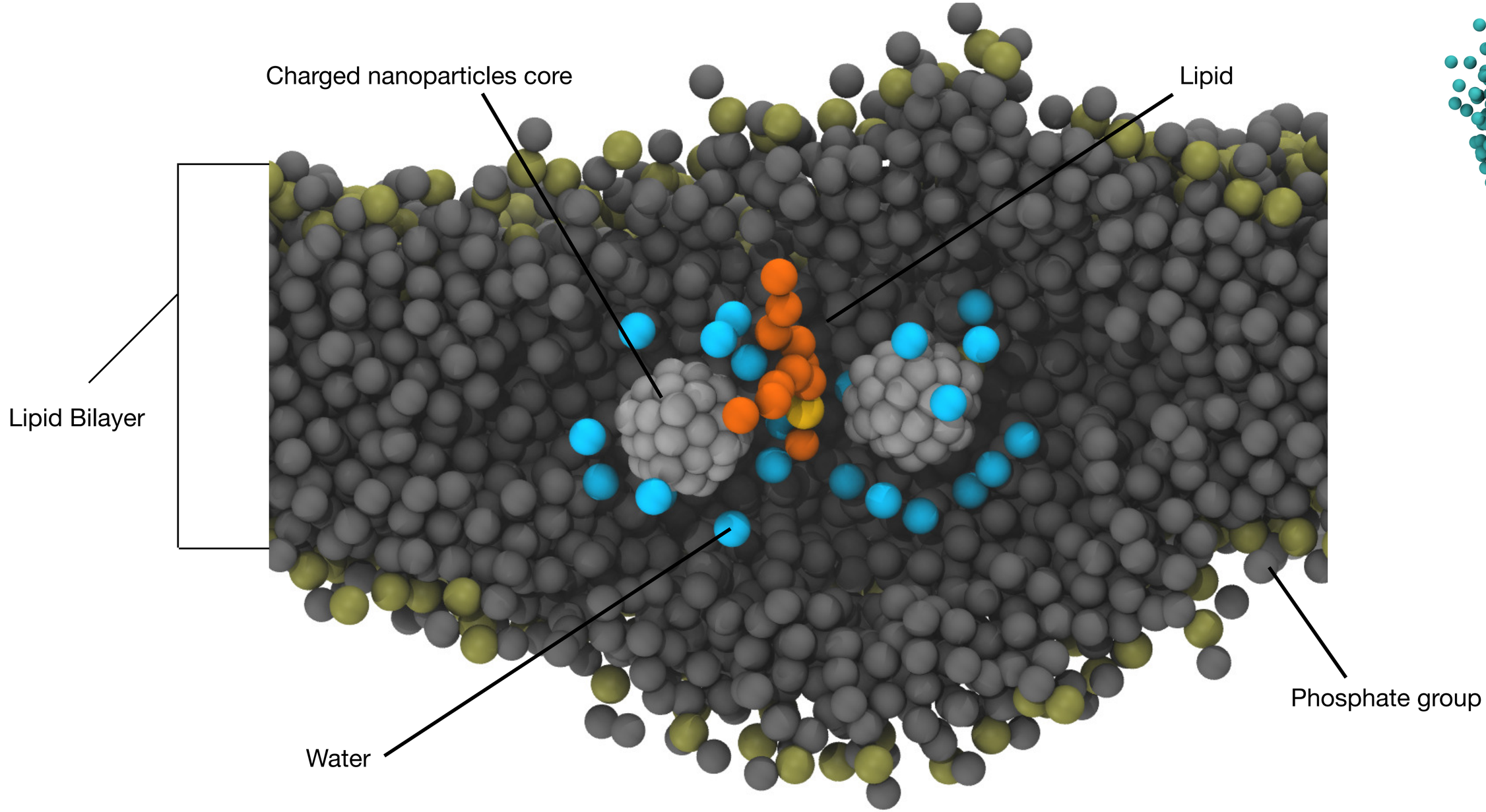


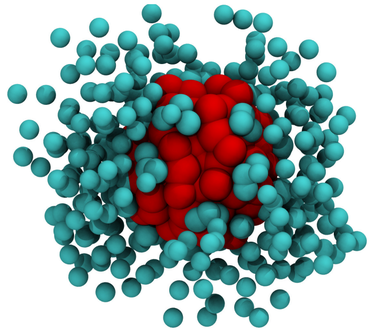
- Pink = Gold Core
- Blue = Gold Surface
- Green = Gold Connector
- Yellow = Sulfur
- Cyan = Ligand



How does nanoparticle aggregation depend on nanoparticle charge?

Lipids tilt and insert between nanoparticle interface





Question motivating my next steps

- How does the amount of solvent-accessible surface area affect nanoparticle aggregation?
- How does lipid tilt depend on distance from the nanoparticle?
- Do charged lipids interact with the nanoparticle surface more than neutral lipids?
- How does lipid length affect interactions with charged nanoparticles?
- How does nanoparticle aggregation affect ligand order?

Currently working on Solvent-Accessible Surface Area Calculations