Sticky Nanoparticles and Surface Coatings

What are surface coatings?
• Surface coatings are molecules that cover the outside of particles.
• Sometimes these coatings are polymers (large chains of connected molecules).

Why are they needed?
• Surface coatings are needed to keep particles in the nano size range (~1 to 100 nanometers) when they are fabricated and incorporated in products.
• Their function is usually to prevent the nanoparticles from sticking to one another.

How do coatings affect the stickiness of nanoparticles?
• Bare nanoparticles are sticky because of their large surface area relative to their small mass.
  
  Exposed surfaces attract

  Electrostatic repulsion

• Surface coatings that are small molecules usually induce a charge on the surface, creating repulsion between nanoparticles.

• Polymers create a barrier that prevent contact between the particle surfaces.

What happens to sticky nanoparticles in the environment?
• When nanoparticles enter rivers, streams, and groundwater, they can stick to soil, sediment, plants, fish, and other environmental surfaces.
• If the nanomaterials have surface coatings, they are less sticky and capable of dispersing widely in the environment.

Try it out!
Make nanoparticles that don’t stick!