



Spinning Nanofibers

Scientists Create Tiny Fibers Like Spider Webs



Natick, MA (Army Research Lab)—Scientists are creating polymer nanofibers 50x finer than spider silk. The fibers are made by applying electric charges to attract and draw out thin strands from a polymer solution. The scientists have many innovative uses for these lightweight and inexpensive nanofibers, including new textiles that can improve health and food safety.

"A nanofiber is a very tiny fiber. When you take a lot of nanofibers and put them together you've increased the surface area many manyfold." Kris Senecal, research biologist

Framework

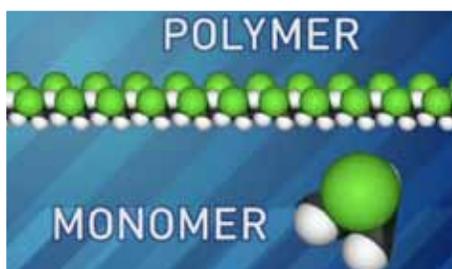
Middle School

Standards

- NSES - B.i.1 ➤ Substances have characteristic properties.
- STL - 10.G ➤ Invention and innovation play a role.
- STL - 14.G ➤ Innovations in medical technologies improve health care.
- STL - 19.I ➤ Chemical technologies alter chemical substances.

Content Illustrated

- Polymers are formed from long chains of monomers.



Content



Life Science

- Antibodies attached to the nanofibers bind to and detect bacteria, such as *E. coli*.
- Filters can capture germs and bacteria to prevent infection.

Physical Science

- Polymer plastics include polyvinyl chloride, nylon, polyvinyl alcohol, polyacrylonitrile and polycarbonate.
- To make nanofibers, the polymers must first be solubilized, or dissolved in solution.
- Polymers are induced with a positive charge and drawn out onto a negatively charged plate.

Technology

- Nano “spider machines” produce multiple fibers simultaneously.

Engineering

- Textiles are flexible woven materials composed of natural or man-made fibers.

Guiding Questions

- What is the advantage of making extremely thin nanoscale fibers?

Suggested Activities

To think about as you watch:

- Find out about other textiles or fabrics made of polymers and how their polymer fibers are made.

Keywords

antibodies, bacteria, *E. coli*, monomer, nanofibers, nylon, poly acrylonitrile, polycarbonate, polymers, polyvinyl alcohol, polyvinyl chloride, solubilize, textiles