ACTIVITY AT HOME

PINK PALACE MUSEUM

Nano

Optics

RAINBOW FILMS

Light reacts differently with nano-sized surfaces.

Materials

Shallow Pan or Tupperware Dish

Strips of Black Paper

Clear Nail Polish (Not Fast-Drying)

Water

Nanotechnology takes advantage of special properties at the nanoscale to create new materials and devices. Researchers are creating thin film batteries, solar cells, electronic displays, and coatings for different surfaces.

Procedure

- Fill the pan halfway with water.
- Slide a strip of black paper into the pan. Make sure it's completely underwater.
- Use the nail polish brush to drip one drop of nail polish onto the surface of the water. The polish should spread out into a thin film.
- Hold one end of the paper and lift it up out of the water. The film of nail polish will stick to the paper. Does the nail polish still look clear?

Results

The nail polish creates an iridescent, rainbow effect on the paper.

Why?

The thin film of nail polish is only a few hundred nanometers thick, about as thick as a soap bubble. The film is slightly thicker in some places and thinner in others. As the thickness of the film changes, the color changes too!

The film reflects light differently depending on how thick it is, so you see different colors. White light is made up of all wavelengths, or colors, of light. Wavelengths that are in sync, hitting both the front and back of the film, are reflected back to your eyes as bright colors. Many things in nature like bird feathers, butterfly wings, shells, and beetle shells all have nano-sized, semi-transparent layers that create an iridescent effect when they reflect light.

This activity was adapted from the *NanoDays* kit by NISEnet.

To learn more about nanotechnology, check out the Pink Palace's *Science of Small* suitcase.