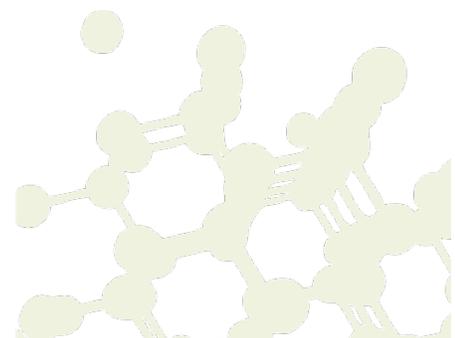




# Exploring Materials— Liquid Crystals

*What's different about nanomaterials?*

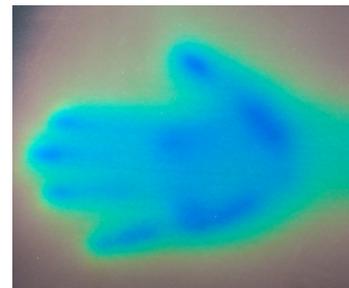




# Exploring Materials—Liquid Crystals

## Try this!

1. Place your hand on the tabletop to warm the surface.
2. Remove your hand. Can you see a handprint?
3. Place the large liquid crystal sheet on the table, in the spot where your hand was. Now can you see a handprint?

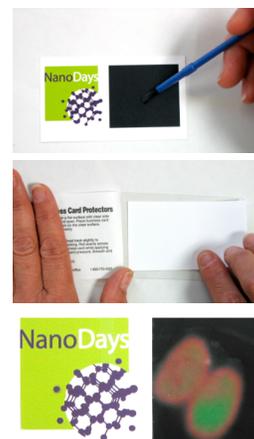


## What's going on?

The liquid crystal sheet is temperature sensitive, and can detect where your hand warmed the table!

## Make a liquid crystal sensor!

4. Put a sticker over the black square of a card.
5. Use a paintbrush to spread a thin layer of liquid crystal mixture on top of the sticker.
6. Carefully place the card face down onto the clear side of a self-laminating pouch.
7. Remove the paper on the other side of the pouch and seal it.
8. Warm the card with your hands. Can you get the liquid crystal to change colors?
9. Now cool it against a cool surface. What colors does it turn?



## Why does it work?

Liquid crystals represent a phase in between liquid and solid. The molecules in a liquid crystal can move independently, as in a liquid, but remain somewhat organized, as in a crystal (solid).

These liquid crystals respond to changes in temperature by changing color. As the temperature increases, their color changes from red to orange, yellow, green, blue, and purple.

## How is this nano?



Laptop with liquid crystal display

**The way a material behaves on the macroscale is affected by its structure on the nanoscale.** Changes to a material's molecular structure are too small to see directly, but we can sometimes observe corresponding changes in a material's properties. The liquid crystals in this activity change color as a result of nanoscale shifts in the arrangement of their molecules.

Nanotechnology takes advantage of special properties at the nanoscale to create new materials and devices. Liquid crystals are used in cell phone displays, laptop computer screens, and strip thermometers. They're also being used to create nanosensors—tiny, super-sensitive devices that react to changes in their environment.

