

Hands-On Thermoplastic

Not too HOT to handle!

Try your hand at shaping PCL!

- ▶ More flexible than polymer clay.
- ▶ More useful than Silly Putty.
- ▶ Easier than a 3D printer.

How does it work?

- ▶ With just a little warmth, this material becomes putty in your hands, to shape as you wish.
- ▶ Let it cool & it becomes tough & rigid, holding its shape.
- ▶ Warm it back up to try again!

What is it?

A **polymer**

- ▶ Its generic name is *poly(caprolactone)*, but we just call it **PCL** for short.
- ▶ It is made of long chains of small molecules all hooked together.
 - ▶ We call this type of material a **polymer**.
- ▶ Manufactured polymers are often just called **plastics**.

Thermoplastics

- ▶ Plastics that can be shaped when warm but which become less flexible when cool are called **thermoplastics**.
- ▶ PCL is sold under a number of different trade names.
- ▶ PCL is a close relative to thermoplastics used in a very common type of 3D printer (*fused-deposition modelling*).

Where do we find other polymers?

3D Printing

- ▶ There is one big difference between PCL and most 3D printing plastics: The working temperature for those plastics (like ABS and PLA) *are* too hot to handle—you could easily get burned if you tried to shape them by hand!
- ▶ PCL is a great way to get a real feel for how these printers work.

In essence **you** become the 3D printer with PCL!

- ▶ **ABS** = acrylonitrile-butadiene-styrene copolymer
- ▶ **PLA** = poly(lactic acid)

Natural polymers

Living things contain a lot of polymers too:

- ▶ **Proteins**
- ▶ **DNA**
- ▶ **carbohydrates**

are all naturally occurring types of polymers.