

Synthetic Fibers

Synthetic fibers are the next step beyond regenerated fibers—seeming like magic when you look at the raw materials which look nothing like fibers. The process involves chemical synthesis of petroleum-based chemicals and petrochemicals. *Nylon* was the first synthetic fiber approved by the FTC with more added quickly. Inventors of synthetic fibers must prove to the FTC that the fiber is different from other approved fibers.

Recent research shows that synthetics most often derived from “plastics” can release microplastics during washing. The microplastics take centuries to biodegrade and are doing damage to the environment. Research is being conducted to make fabrics that can be recycled and reused. Currently more designers are considering using natural fiber fabrics—especially those that follow eco-friendly and socially responsible manufacturing practices.

In this short course—we’ll look at the synthetic fibers that are used in apparel and interior fabrics. First, I review briefly the least used fibers that are included in the TFPIA.

Synthetic fibers Least used in apparel & interior products

The least used synthetic fibers for apparel and interiors can be grouped according to general characteristics and uses:

High tech fibers used for extreme environments, protective clothing, and industrial textiles include: *PBI* (polybenzimidazole), *novoloid*, *sulfar*, *ceramic*, *PTFE* (tetrafluoroethylene), and *aramid*.

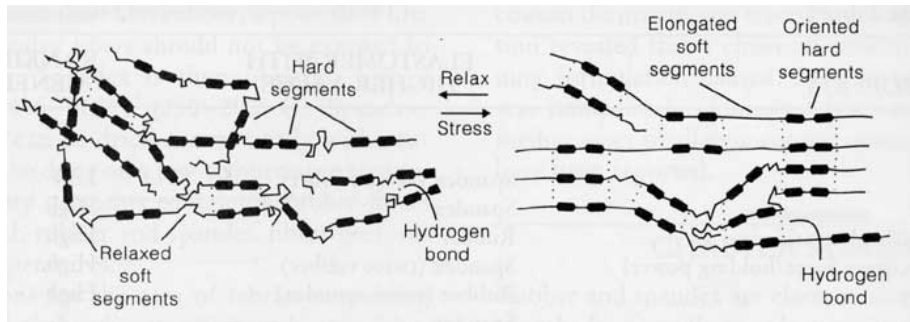
You may have heard of *aramid* for use in high strength and flame-resistant products. The most recognized trade names are *Kevlar* (high strength) and *Nomex* (heat-resistant). *Aramid* fibers use in retail products includes hiking shoe uppers, cut-resistant gloves, and luggage. *Aramid* fibers are mixed into other substances to add strength and resilience to products: tires, skis, snowboards, and canoes.

“Plastic-type” fibers include: *nytril*, *celiox*, *vinal*, *vinyon*, and *saran*. *Saran* may make you think of “saran wrap”—a film used to cover and protect food. *Saran* in fiber form is used for doll hair. These plastics are sometimes extruded in sheet form, so you may see them used to provide a water-resistant layer for fabrics.

Synthetic fibers Commonly used in apparel & interior products

Elastomeric fibers include: *elastoester*, *rubber* (synthetic), *lastrile*, *anidex*, polyurethane, *chloroprene*, and *spandex*.

If you could look at an elastomer fiber molecule structure, you would see that in the relaxed state segments are “lax.” When the fiber is pulled end-to-end the segments straighten and bonds strengthen as the fiber lengthens.



Elastomeric fibers stretch and return to shape. Home sewers and crafters use elastomers in selected places—elastic waistbands are used in apparel—the industry calls these products “narrow fabrics.” Natural rubber was the first fiber used for these products—but deteriorated when exposed to body oils, so rubber was covered with fibers like cotton to prevent natural rubber deterioration. Now most elastics bands are made of synthetic materials—*synthetic rubber, chloroprene, and polyurethane*.

Spandex

Most consumers are familiar with *spandex* which is spun with other fibers into a yarn and then woven or knitted into fabric. *Spandex* was introduced in 1958 by DuPont with the trade name *Lycra*—so *Lycra spandex* became very popular. Typically, *spandex* is a small percentage of fiber in fabric; percent depending on how much stretch is desired in the fabric. *Spandex* can be dyed along with the other fibers in the yarn, making it a good choice for apparel and interior fabrics.

One of the first *spandex* fiber blends was with *nylon* for use in swimwear and exercise wear. “Stretch” denim was introduced and then “comfort stretch” became popular in many apparel items.

Elastoester and *lastol* are similar to spandex but are less common.

We will study the most common synthetic fibers in the next sections:

Nylon

Polyester

Acrylic

Modacrylic

Olefin