

## + What is lyocell?

Lyocell is a cellulosic fiber made by dissolving bleached wood pulp and then extruding a textile fiber using dry jet-wet spinning. It is a type of rayon first commercialized in 1998.

Lyocell is more expensive to produce than viscose rayon. Staple fibers are used in denim and chinos. Filament fibers are softer and silkier than staple and are used in women's clothing and dress shirts. Lyocell can be blended with other fibers such as silk, cotton, rayon, polyester, linen, nylon and wool.

## + How is lyocell made?

Lyocell is made from hard wood such as oak or birch. The wood is first chipped into small squares and then treated with sodium hydroxide and sodium sulfide to remove lignin and hemicellulose and to create the wood pulp.

The pulp is bleached and dried into a continuous sheet for further processing. The dried pulp, which resembles poster board, is broken into squares and dissolved in an organic solvent called N-methylmorpholine N-oxide, which creates a solution called dope.

The dope is pumped through spinnerets, which resemble showerheads. When the solution is forced through the spinneret, continuous strands of filament are formed. These are allowed to stand in the air to align the cellulose molecules and then immersed into a water bath with diluted amine oxide that fully forms the lyocell fiber.

Finally, the fibers are washed with demineralized water and dried to remove all remaining water.

## + What currently limits (this material) as an input for the circular economy?

There are few issues with lyocell as an input for the circular economy. As with other cellulosic fibers, feedstock of wood pulp must be sustainably sourced in order for the material to be truly circular. Approximately 70 million trees are logged annually for fabrics — approximately one-third of which are from ancient and endangered forests.

## + Why was **lyocell** chosen for the Call to Innovation?

Lyocell was chosen for the Call to Innovation because of the non-toxic processing chemicals, as well as its potential to reach *Cradle to Cradle Certified GOLD* level certification.

It is a versatile cellulosic fiber and used in a variety of apparel items by many brands. It is used to make luxury goods as well as casual apparel such as jeans. Lyocell fiber can be made with fast-growing wood in closed loop facilities that embrace waste minimization and renewable energy. The solvents used to manufacture lyocell are recycled in a closed loop manufacturing process.

## + What is the action plan for **lyocell** through the Call to Innovation?

Fashion Positive PLUS members have identified TENCEL®, a branded version of lyocell made by Lenzing, as a candidate for further action.

The Fashion Positive PLUS members engaged Lenzing in May 2017 to begin the certification process for TENCEL®.

TENCEL® has the following sustainability attributes that make it a good candidate for *Cradle to Cradle Certified GOLD* level certification:

- + Its production generates zero waste through closed loop manufacturing using safer organic solvents.
- + TENCEL®'s inputs are fast-growing wood from sustainably managed forests.

Once TENCEL® has been optimized and certified, it will be added to the Fashion Positive Materials Collection.

## + What's exciting about priming **TENCEL®** as an input for the circular economy?

TENCEL® should easily reach *Cradle to Cradle Certified GOLD* level certification. This fiber is growing in popularity because of its sustainability attributes as well as its desirable aesthetic. Lenzing is in the process of doubling their manufacturing output due to the growing demand for TENCEL®.