

**Biosynthetic Textiles in the Apparel Industry**

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**Abstract**

This research paper will describe the fashion advancing in more sustainability and eco-friendly by technological innovations in the future. To better understand how science and technology are helping to innovate the development of textile fibers, this study will primarily focus on the effect of biosynthetic fibers on the fashion industry. We will state the definition and significance of the alternative of providing biosynthetic fibers in the industry, how the industry is fighting back, and alternatives to the method of dyeing. The fashion industry has improved in many aspects of science and technology to save the planet.

### **Introduction**

In the fashion industry, the main ethical issues are harmful chemicals, global transport of goods, accumulation of waste, greenhouse emissions, water pollution, consumption, and non-biodegradable packaging add to the environmental cost. The combined effect has placed the sector under scrutiny by customers who want to know where their clothes are made and how. They demand ethical practices and retailing that is responsible. Sustainability in fashion is a controversial topic, with local and global retailers racing to prove their green credentials, but as climate activists the appetite for new attire churns and the industry remains one of the world's largest polluters. "The industry is the second-largest consumer of water and is responsible for 8-10% of global carbon emissions, more than all international flights and maritime shipping combined, according to the United Nations Environment Program" (Fortune, 2019). Many innovations are trying to bring a change in sustainability and providing more alternatives. These alternatives will bring change in the industry and bring improvements to sustainability.

### **Impact of Biosynthesis Fibers**

Synthetic fibers are made from raw materials such as petroleum-based on petrochemicals or chemicals consisting of superior properties to natural fibers such as cotton or silk. Some synthetic fabrics are polyester, acrylic, nylon, rayon, acetate, spandex, latex, and Kevlar. Synthetic textiles are either manufactured from inorganic materials or a blend of organic products and chemicals. Silk, wool, cotton, and linen are the most common natural fibers in the clothing. The textile factories are bringing environmental pollution problems that the planet is facing. "A biosynthetic fiber consists of polymers made from renewable resources, either wholly

or partly” (TextileExchange, 2018). These non-renewable sources take up to millions of years to form and are harmless to the environment and health. Biosynthetic fibers offer an innovative and environmentally sustainable way to manufacture textile fibers without causing a lot of damage to the environment. The fashion industry needs more biosynthesis fibers for being eco-friendly.

### **Sustainable Fashion Brands**

Sustainable fashion is a movement and process of bringing a change to the fashion system for greater ecological integrity and social justice. Some small businesses like petite are trying to make clothes that would long last and could be comfortable for any season and occasion. Among fashion companies that are now considering sustainability in their collections, the environmental effect of the fashion industry has helped raise some questions. Two fashion companies who are advocating for an eco-friendly environment and have considered using sustainability in their collections are Petite Studio and Sézane. Both of these companies are ethical & small batch production, natural and sustainable materials. These two brands are eco-friendly fast fashion that produces sustainable materials that benefit people and the planet. Figure 1, Emily Cotton Top- Daisy Print from Petite Studio shown below (front and back view) is 100% cotton and it's a light and soft fabric designed for ultra comfort and movability. Similar to that brand is Figure 2, Tomboy Shirt from Sézane shown below (front view) it is 100% cotton and 100% natural. They are setting a good example of sustainability in the fashion industry. These two brands are well aware of the danger the environment faces if their pollution persists in the market, and they also express the example that the market will shift for the better as well. The brands offer pricey garments because of the material they are made of but some garments have

different prices depending on the quality. They have special treatment of how to take care of them to keep them long-lasting. Middle and high class could effort them and people with good salaries.



**Figure 1:** Petite Studio (2020). Emily Cotton Top-

Daisy Print

**Price:** \$129.00



**Figure 2:** Sézane (2020). Tomboy Shirt

**Price:** \$104.18

### Sustainable Alternatives Fibers

The discovery of more sustainable alternatives for the processing of textile fibers has been made possible by certain technological advances in the industry. For example, the company Piñatex is about creating a new, non-woven textile that could be commercially produced, provide positive social and economic impact, and maintain a low environmental footprint throughout its life cycle. The company Piñatex is invented by Dr. Carmen Hijosa who is a leathersgoods expert and she was consulting on the Philippines leather export industry in the 1990s. The creator of Piñatex is Ananas Anam and their main goal is to “innovative products in which commercial success is integrated with, and promotes, social, ecological and cultural development” (Piñatex, 2020). The company Piñatex works to supply other sustainable alternatives to create products such as shown in Figure 3 shown below (front and back view), Paprika Pineapple Trench Coat from Mariam Al Sibai is made of pineapple leaves. The company Piñatex is showing that clothing could be made out of any natural or synthetic sources.



**Figure 3:** Mariam Al Sibai (2020). Paprika

Pineapple Trench Coat

**Price:** \$1,040.02

**Color:** Paprika

Many companies are innovating in textile fiber and creating some amazing clothing out of strange fibers. In Figure 4 shown below, A dress made from bacterial fermented wine fabric was created by visual artist Donna Franklin & Scientist Gary Cass in a 2012 collaboration in an FNAS laboratory of the University of Western Australia (UWA). “Unlike the wine dresses, the new Beer Dress has no smell and greatly improved flexibility, with fibers that are chemically similar to cotton” (CNET, 2015). The dress is fun, flouncy, bouncy with a fitted top, and an exuberant puff of fabric at the bottom. “Cass is working on improving both the strength and flexibility of the Nanollose fabric and would like to see it become an environmentally friendly alternative to the use of agriculture-intensive fabrics like cotton” (CNET, 2015). By introducing acetobacter (the bacteria used in the fermentation process of turning wine into vinegar) into vats of wine, the dress was made entirely from large amounts of fibrous cellulose (the structure that makes up stringy plant cell walls). When grown in a glucose-containing solution, the bacteria produce cellulose. In its position, other alcohol, like beer, may be used. "This microbial cellulose [produced] is chemically similar to cotton” (WIRED, 2012). "Therefore the Micro-be garments are made from microbial cotton. (WIRED, 2012). The material that results is then draped over a mannequin and it shrinks to match. Rather than a human, it is modeled on an inflatable mannequin because when dry, the cellulose becomes inflexible and easily broken. "We have now perfected a culturing technique that will allow the bacteria to form a three-dimensional garment that will be seamless” (WIRED, 2012).

**Figure 4:** Beer wear: Dress made from bacterial-fermented brew (CNET, 2015).



### **Sustainable Dye Alternatives**

Dyes can be characterized as substances that provide color when applied to a substrate through a process that changes, at least temporarily, the crystal structure of the colored substances. In the textile, pharmaceutical, food, cosmetics, plastics, photographic, and paper industries, such substances with substantial coloring capabilities are commonly used. “Unfortunately, most of these dyes escape conventional wastewater treatment processes and persist in the environment as a result of their high stability to light, temperature, water, detergents, chemicals, soap, and other parameters such as bleach and perspiration” (IntechOpen, 2013). The company Colorifix was invented by Orr Yarkoni CEO and Jim Ajioka, a Chief Science Officer. Colorifix is known for sustainability and is at the very heart of what we do, and we agree that it needs to be environmentally, financially and socially sustainable for a technology to be truly sustainable. “10 times less water than traditional dyeing processes and does not use heavy metals, organic solvents or acids” (McCartney, 2018). This business has introduced an uncommon way to give textile fibers color and pigment and it comes entirely from nature itself. The DNA that produces color in nature is isolated by this company and converted into dyes that can be used in textiles. In Figure 5 shown below, Stella McCartney collaborated with the Colorifix company and created a sustainability and innovation dress. Their goal is to change fashion into eco-friendly and sustainability completely. The dress is based on a relationship between fashion and nature. This is one way of bringing a good effect of Technology to change the textile industry with sustainability.





**Figure 5:** Stella McCartney X Colorifix dress

**Image Credit:** Prestigieux, 2018.

### **Experimental Artistic Process**

Designers, motivated by their characteristics and materials, are forging strong correlations with nature. Acting with nature and in teams through various fields, their collaborative methods are positive responses at this moment when humans compete with our planet's problems and conditions. Designers look to nature as a guide and companion, compelled by an urgency. One of the fashion designers who are trying to bring a change to eco-friendly alternatives and sustainability is Charlotte McCurdy an interdisciplinary designer and a researcher who focuses on making existential threats, such as climate change, more tractable through design. For her project "After Ancient Sunlight," McCurdy fashioned a water-resistant raincoat from a plastic-like material she developed made of algae, which naturally sequesters carbon from the atmosphere (McCurdy, 2020). Figure 6 shown below, is the water-resistant raincoat and made by using technology and science. The raincoat is not meant to be worn, it's

just to show what's the material is made of and designers could avoid using its environmentally harmful techniques.



**Figure 6:** Charlotte Mccurdy raincoat made out of algae.

**Image Credit:** Dezeen, 2019.

### **Conclusion**

In the fashion industry, there have been many improvements, and has become eco-friendly and sustainable. “We believe that a key part of ethical fashion is buying clothing that we plan to get a lot of use out of, clothing that won’t end up in the trash or donation pile a few months down the road. To do so, we need to select fabrics that we will enjoy wearing – that feel good next to our skin – and that will last” (TreeHugger, 2020). Many designers, brands, and consumers have progressed in environmentally harmful processes and bringing a change in the fashion industry. Many innovations such as Stella McCartney, Petite Studio, Sézane, and more have created materials that have made an example of a good change. Hopefully, designers will understand how harmful practices are destroying the planet and might then try to save it and make the industry more eco-friendly and sustainable.

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