

EXPLORING THE APPLICATIONS AND DANGERS OF SYNTHETIC FIBRES IN FASHION

SYNTHETIC FIBRES IN FASHIC

Overview of Application

Dangers/Nega



Regenerated Cellulose Fibres, otherwise known as Semi-synthetic fibres, are regenerated plant based fibres. These are usually made from woods pulps dissolved in chemicals. (Textile Exchange, 2024).

Consumer Insights

Figure 1: Survey Result (Authors' own, 2024) In the survey conducted 29 Gen Z consumers were asked their preference's and awareness of fabric types in order to gain understanding of Gen Z's attitudes towards synthetic fabrics

58.6% of the Gen Z consumers who took part in the survey could not differentiate between natural and synthetic fabric.

55.2% would prefer to buy naturally derived





N: DANGERS & SOLUTIONS

tive Impact

Identified Potential Solutions

RESPIRATORY INFECTIONS

Studies have confirmed that exposure to <u>synthetic fibres</u> can cause respiratory infections like pneumonia



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CARCINOGENS

<u>Polyester</u> and <u>nylon</u> found to contain multiple carcinogens

REDUCED SPERM COUNT

<u>Polyester</u> proven responsible for reproductive system disorders like reduced sperm counts.

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What can this replace? The use of animal fur and synthetically made faux fur using acrylic fibres. It claims to reduce microplastic in water and air stream as part of production

<u>BioFluff using plant based</u> <u>fibre to replace animal and</u> faux fur

The recent innovations above provide a more sustainable and less toxic option for certain synthetic materials like PVC/ PU. They are derived naturally and go through limited chemical processing. The examples shown recycle food waste (e.g pineapple, hemp, algae) that is already biodegradable which also helps reduce waste, they also release less carbon emissions in their

production.

Biomaterial Innovation

Although biomaterials seems a more sustainable alternative with limited health risks, the cultivation process may be too costly to multi produce and meet industry demands. However for higher end products and retailers it is a definite viable alternative and its production could be potentially altered to reduce costs

What can this replace?

offer's an alternative to petroleum based fibres. The form of bio-plastic used in the dress could work as a substitute for plastic embellishments like sequins.



Bacterial Cellulose

Bacterial Cellulose (BC) is generated from a network of carbohydrate molecules which can be found in organic waste. The bacteria is grown in vats consisting of growth media, which is a form of gel or liquid

used in growing microorganisms.

Enhancing Natural Fibre Production

The standards & procedure of Organic Cotton:



cellulose fibre a 'sustainable nthetic fibres t exploitation. creating additional strains to freshwater supply.



Unprocessed Bacterial Cellulose & Pieces of clothing made from BC (Choi et al., 2022)



nemicals

Designers like <u>Natsai</u> <u>Audrey Chieza</u> are experimenting with using actinobacteria to naturally dye fabric.



Piece of fabric dyes by S.coelicolor (Chimileski, 2017)

Towards Affordable Sustainability: Optimizing Natural Fibre Production and Eliminating Synthetics By: Chealy Oeng (10831310)

Macro Issue

Synthetic fibres have dominated the textile industry by accounting for 65% of the global fibre production (Textile Exchange, 2023). Due to their nonbiodegradability, fashion companies have chosen to source recycled or regenerated versions as part of their initiative towards circularity. Although these innovative fibres contribute in reducing landfill, they still have the same impact as virgin synthetics. Synthetic garments can release up to 700,000 microplastic particles into the air and water stream from a single wash (Somers, 2020), which poses harm to both the environment and human's health.

Micro Solution

Despite being aware of the negative impact of synthetic clothes, the majority of consumers still prioritize price and design over sustainability. With the ever-evolving trends and constant demand for newness, the ultimate solution to the use of synthetic fibres in clothings is to integrate sustainable natural fibres into mass-produced fashion. Hence, making sustainable fashion more accessible and affordable.



Finding the golden mean between fast and slow fashion.

Main reasons synthetic fibres are dominating the market:

- Cost
- Accessibility
- Durability
- Versatility

Scalable production of sustainable natural fibres needs to be achieved in order to reduce their cost and replace synthetic fibres. Moreover, the sustainability standards of the fibres needs to be ensured from the farming process up until the final product.

References

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rability & Versatility Assessment rasion Test on Single Jersey Knitted Samples



Experiment with Red Cabbage Dye

Key findings: Nylon and acrylic did not

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A Study on Potato Starch **Bioplastic as** Replacement for Polyethylene and other Petroleum-Based Plastics

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PLASTIC: THE PROBLEM

Polyethylene, PVC, PU are materials used in the fashion industy that cause **irreversable damage** to the environment and our health

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Short

As discussed as part of the macro topic investigation, plastic-based fibres wreak havoc on our ecosystems and health causing issues such as microplastic waste and even medical complications like reproducive disorders. An alternative is crucial for the fashion industry to continue to thrive! Since researching alternatives to 4 main synthetic fabrics used in the industry, I wanted to also take a further look at other plastic-based polymer materials used such as PE, PU and **PVC**. These materials are harder to **replace** than cloth-like synthetic materials like **acrylic** and **polyester**. This is because **acrylic** and **polyester** naturally **mimic** non-synthetic materials like **wool** and **cotton**, however polymers such as **polyethylene resemble** a **rubber-like plastic texture** which is much **harder** to **imitate** using natural biodegradable utilises Waste materials.

THE SOLUTION?

So, how can we mimic this rubber-like material without any detriment to the environment or human health? **Bioplastic!** Potato-based bioplastic is not only **non**toxic and biodegradable, it can also be cultivated from potato waste which contributes to a "circular economy". However, it must be tested further to ensure its potential.

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Potato-Starch **Bioplastic**

may present a promising potential alternative to conventional plastics such as **polyethylene**. with benefits such as...

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Polyethylene (PE) dominated the product segmentation in 2023 with a market revenue share of above 24.0% (GVR, 2023)

WHAT I'M DOING

I have developed 5 bioplastic sample solutions comprising of potato starch bioplastic plus a range of different fillers. I am testing these sampled to underpin their differing properties and determine the most ideal alternative to polyethylene. Then, based on these results, i will determine how the orch Most Ave Nost Biodeg, Nost Durob ot de Most Oog material could be implemented in the market! Nater- A650

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