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HOW ECOLOGICAL CAN IT BE?

Sustainability | The trend towards sustainability and biodegradability in cosmetics does not stop at the popular sheet masks. Thanks to ecological fibres and new manufacturing technologies, more and more is possible here. Johannes Loos knows what options these fibres and technologies offer, but also where the limits lie, for example to enable complete compostability.

photo: Norafin Industries (Germany) GmbH

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They are now available in every drugstore, from basic products for a few Euros or Dollars to premium items in the upper price segment: the sheet mask. The mega beauty trend, originally from South Korea has started its triumphant march around the world and continues to gain popularity.

Sheet masks mostly consist of a thin nonwoven, usually made of PET, viscose, lyocell, bio-cellulose or cotton, which, soaked with a serum, has a nourishing, cleansing, or refreshing effect on the skin. The applied sheet perfectly conforms to the contours of the face and generates warmth, allowing the ingredients to be better absorbed by the skin. Sheet masks are considered to be highly beneficial and effective.

More eco-friendly design?

However, if we put the cosmetic aspect aside and look at the **environmental footprint**, the beauty trend loses some of its shine. Sheet masks are purely disposable products and cause a lot of waste. Many manufacturers require a carrier film for sheet masks, and they are also packaged in individual sachets. If you follow the application recommendation, according to which the highest effectiveness is achieved if the products are applied several times per week, it is easy to guess what mountains of waste are generated by the cosmetic miracle.

Keeping the ecological footprint of a sheet mask as small as possible requires the interaction of several actors in the supply chain. The aim should be to reduce the amount of plastic and artificial ingredients to a minimum, or even eliminate them altogether. A look at the Environmental Technology Atlas 2021 for Germany[1] reveals that consumers are increasingly concerned about the ingredients of cosmetics and that the global market volume for natural cosmetics will be around 40 billion Euros in 2030. The EU also wants to increase buyers' ecological awareness with the mandatory labelling of products containing plastic (Single Use Plastic Directive, SUPD), which has been in force since July 2021.

The **composition of the fabric**, as the main component of the face mask, plays a decisive role. While the cosmetics industry places high

Flax is a natural fibre that is even less known in connection with the production of facial mask sheets.

demands on the performance of the thin textile, it should also be sustainably produced and biodegradable. A variety of fibres can now strike an excellent balance between functionality and environmental friendliness.

Base material

A standard material established on the market is **viscose**. This is a fibre obtained from the raw material wood, which is compostable due to its botanical origin. Viscose sheet masks are particularly gentle on the skin, comfortable to wear due to their breathability and can absorb and release liquids well.

An even more efficient material is the **lyocell** fibre. As well as being suitable for particularly sensitive skin, this fibre stands out for its high tensile strength, even when wet, and its high translucency when in use, which ensures that it conforms perfectly to the skin while being soft and comfortable to wear. Like viscose fibre, lyocell fibre is a product of botanical origin and is therefore biodegradable and even washable.

Although both fibres are produced synthetically, they are still compostable. Both processes are closed process cycles in which the cellulose of the pulp must first be converted. Unlike the viscose process, which uses chemical processes, the lyocell process dissolves the pulp without any chemical modification in a closed process loop, without the use of carbon disulphide. 99% of the solvents used are returned to the production process.

If you want to offer the fabric for sheet masks completely without chemicals or the use of solvents, you can use natural fibres such as cotton, flax, or hemp. Reusable cotton sheet masks are already establishing themselves in the market, although this raw material is not without its concerns. **Cotton** farming promotes monocultures and thus requires the use of mineral fertilisers and pesticides. Moreover, 75% of the world's cotton must be grown on artificially irrigated fields, and the high-water demand promotes the desertification of landscapes.

Still little established, but all the better alternatives to cotton, are **flax and hemp** fibres. These require much less water for cultivation and do not make any demands on the soil. Suitable cultivation areas are available in Europe, which helps to protect the environment by cutting out long transport routes and virtually eliminating the need for chemical fertilisers. The natural properties of these fibres alone qualify them for use as a fabric material. Nonwovens made of flax or hemp fibres have very high inherent stability and absorbency and can be processed into sheet masks either in their pure form or in combination with lyocell fibre. The proportions of the respective raw materials may vary. With different mixtures, the properties of the nonwoven then naturally change.

Production processes

Lyocell is an extremely tear-resistant fibre that is very stable even when wet. This property is very important for sheet masks, e.g., when you take the mask out of the sachet and unfold it. Then it should neither tear nor lose its shape. Lyocell fibres become translucent when wet, which is also an important property.[3]

When working with such natural fibres, the production process of the fabric also plays an important role. Flax or hemp fibres are particularly stubborn fibres that place high demands on processing. Only a few manufacturers worldwide are currently able to process these fibres on their equipment.

Using a **water jet process**, the three-dimensional fibre alignment created by air turbulence of the fibres results in a nonwoven that is tear-resistant,

photo: Norafin Industries (Germany) GmbH

VISCOSE PROCESS

In a first step, the cellulose in the pulp is converted and matured before the eponymous spinning solution is produced in the core process of the viscose process, the sulfidation process step. This honey-like, viscous mass is further refined in further physical process steps to increase quality before it is pressed through fine nozzles into the spinning bath. Here, the cellulose originally used is completely regenerated under precisely defined process conditions, resulting in fibres with predetermined properties and quality characteristics. In the further course of the process, the fibres are cut, subjected to a coordinated washing process, and dried.

LYOCELL PROCESS

The basic raw material is dissolving wood pulp from sustainable forestry. In contrast to the viscose process, an organic solvent called N-methylmorpholine-N-oxide (NMMO) is used to directly dissolve the pulp without any chemical change. For this reason, it is considerably simpler than viscose production. The technology[2] enables more than 99% of the solvent to be recovered in a closed chemical loop and then fed back into the production process.

cleaned, and soft in all directions, biodegradable and fully compostable at the end of its life cycle. The fibres are strengthened by pure waterpower and are completely free of chemicals, which can eliminate the need for additional masking agents.

The **stability** of the resulting nonwoven also makes it possible to dispense with the plastic carrier, which is used at one point on the production side to stabilise the nonwoven for packaging, but also to prevent it from tearing when the cloth mask is unfolded from the sachet.

Natural cosmetics trend

Using natural fibres to make the nonwoven for sheet masks is a big step in helping to shape the megatrend towards natural cosmetics. A prerequisite for the environmentally compatible disposal of these sheet masks is, of course, that the ingredients with which the cloths are impregnated are also free of chemicals.

Environmentally friendly alternatives to plastic are also already coming into focus when it comes to packaging. A sachet has to meet a number of ambitious demands, including that moisture remains in the sachet and that the face mask does not dry out even over a long period of time.

For example, there is already coated paper or packaging made of polylactic acid (PLA) on the market, which can then be industrially composted. But industrially, not biologically. Making the packaging fully organic is not easy, as the face mask needs to be kept moist in the sachet.

Other approaches can be that – as is common in cosmetic studios, for example – the sheet masks are packed dry, then simple paper packaging can be used, and the lotion is only applied when it is used.

Conclusion

So, what is the verdict on the cosmetics hype from South Korea? The sheet masks score high in user-friendliness and effectiveness. However, society's increasing environmental awareness and the ever louder demand for sustainable production and for companies to assume responsibility for the environment and society are forcing manufacturers of cosmetic sheet masks to rethink their approach.

Consumers will increasingly focus on environmental aspects such as sustainability and reuse, forcing producers to turn to environmentally friendly alternatives. The market potential for sheet masks is far from exhausted, but in the medium term, manufacturers who focus on sustainability in production, materials and ingredients will have a clear lead. □

References:

1 Greentech made in Germany 2021 – Umwelttechnik-Atlas für Deutschland, p 42, https://www.bmuv.de/en/publication/greentech-made-in-germany-2021-umwelttechnik-atlas-fuer-deutschland

2 Process developed by Lenzing

3 https://www.veocel.com/de/product/beauty