



Textile Study on Face Sheet Masks

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Abstract

This document examines facial sheet masks, a global skincare trend known for hydration, rejuvenation and ease of use. Originating in Japan and South Korea, these masks are made from materials like cotton, hydrogel and bio cellulose, infused with serums targeting diverse skin concerns. It highlights innovations like nanofiber technology and 3D printing, along with market growth projected at a 6.8% CAGR. Key issues include single-use waste, non-recyclable packaging and environmental impact. Despite these challenges, the rising demand for personalized and eco-friendly solutions is shaping the industry, emphasizing the need for sustainability in this rapidly expanding cosmetic segment.

Keywords: Facial sheet masks; Skincare innovation; Hydration and rejuvenation; Nanofiber technology; Environmental impact; Global market trends

Introduction

Facial sheet masks have emerged as a pivotal innovation in the skincare industry, revolutionizing the way consumers approach beauty and self-care. Originating in Japan and South Korea, these products have gained global popularity for their simplicity, convenience and efficacy. Unlike traditional paste-based masks, sheet masks consist of fabric sheets soaked in nutrient-rich serums designed to deliver targeted skincare benefits such as hydration, brightening and soothing effects. Their rapid results and ease of use make them an essential part of modern beauty routines, appealing to a broad demographic [1].

The materials used in sheet masks range from inexpensive non-woven fibers to advanced bio cellulose and hydrogel fabrics, offering varying levels of absorption and skin adherence. Advances in manufacturing, including nanofiber technology and 3D printing, have further enhanced the performance and customization of sheet masks. Additionally, the global sheet mask market has seen consistent growth, driven by increasing consumer awareness, demand for natural and eco-friendly products and innovations in skincare technologies.

However, the industry faces significant challenges, particularly concerning the environmental impact of single-use masks and their non-recyclable packaging. This document delves into the evolution, composition, benefits, challenges and market trends of facial sheet

masks, offering a comprehensive overview of this dynamic and rapidly expanding segment of the cosmetic industry [2].

Technical textile

Technical textiles are specialty fabrics made for uses, such as protective apparel, medical implants, embankment geotextiles, automotive parts and agrotexiles for crop protection. Known for their technical performance, these materials have a lot of unrealized potential in India, which highlights their significance in the textile sector and the range of uses they can have (Figures 1 and 2).



Figure 1: Water repellent fabric.

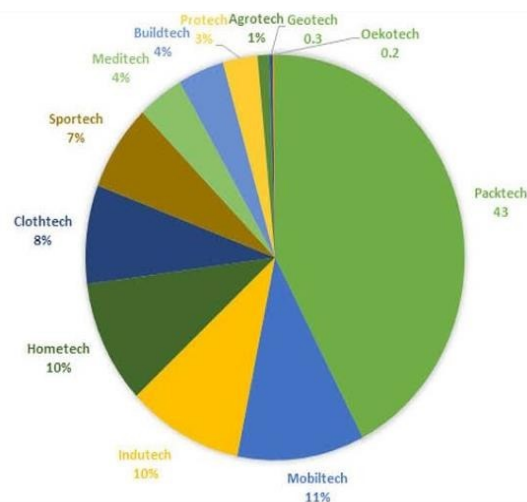


Figure 2: Sector-wise consumption of technical textile.

Technical textiles now account for about 13% of India's entire textile and clothing market and make up 0.7% of the GDP of the nation [3].

Meditech

Meditech, another name for medical textiles, is what these are. Textile materials for personal care, health and hygiene as well as surgical applications are included in Meditech products. Depending on the application, Meditech's products come in knitted, woven and non-woven forms. Many common fundamental textile qualities, such as

CBD. Probiotics in skincare products have been shown to balance the skin's microbiome, which can help with wrinkles, acne and eczema.

How are sheet mask used?

Cleanse your face, apply, wait 20 to 30 minutes, remove, and enjoy! Throughout the day or week, you can use it as frequently as you like. Because you can use sheet masks while cleaning, cooking, reading or watching TV, they are ideal for people who are busy and hardly have time for relaxation. The good news is that after applying, you don't have to bother cleaning it off!

Although the sheets are one-size-fits-all, it would be simpler to begin at the forehead and gently pat it as you move down to your face, aligning the holes for your eyes, nose and mouth because no two faces are the same size or shape (Figure 6) [7].



Figure 6: Steps to apply sheet mask.

History

From where did sheet masks come?

For centuries, facial masks have been an essential part of skincare routines, with a variety of cultural applications ranging from religious and medical to cosmetic enhancement. Their development reflects shifting standards of beauty and wellbeing.

Herbal masks were used to support skin health in Asian cultures, while natural ingredient masks were used for cleansing and beautifying purposes in ancient Egypt. The evolution of face masks to a wide range of contemporary products today demonstrates their adaptability to societal values and skincare requirements.

Examining this past shows how popular face masks have remained over time and how important they are to the quest for glowing skin [8].

South Korea and Japan, two countries renowned for their commitment to skin care and cosmetics, are the origins of sheet masks. Sheet masks are currently very common throughout Asia. Due to the use of sheet masks by numerous celebrities and their social media posts, sheet masks are currently revolutionizing the beauty industry and becoming more and more popular in the United States. According to a recent study by NPD Group in the USA, mask sales

rose by roughly 60%, outpacing sales of other skincare product categories (Figure 7).



Figure 7: Skincare in ancient Egypt.

Origin and evolution: For centuries, facial masks have been an essential part of skincare routines, with a variety of cultural applications ranging from religious and medical to cosmetic enhancement. Their development reflects shifting standards of beauty and wellbeing.

While Asian cultures used herbal masks to support skin health, ancient Egyptians used natural ingredient masks for cleansing and beautification. The evolution of face masks to a wide range of contemporary products today demonstrates their adaptability to societal values and skincare requirements.

Following the success of the Korean skincare movement in 2016, sheet masks gained popularity in the United States. Prior to sheet masks, most American beauty masks were thick, paste-like substances that required manual application and time-consuming washing after use. Korean sheet masks became popular because they were simple to use all you had to do was apply them to your face for 15 to 20 minutes without washing. As their popularity increased, American beauty brands started making sheet masks, which were then made widely accessible. Their convenience allowed them to become a part of people's everyday skincare routines rather than something reserved for special occasions. Sheet mask technology originated in the medical field and was first applied to bandages. Cotton nanofibers were used in the electrospinning process to create breathable masks (Figure 8).



Figure 8: Face sheet masks used in early 90's.

Why sheet masks were developed?

Beauty sheet masks have been the most talked-about and popular product since the Korean skincare craze in the US in 2016. Most of the skincare and cosmetics companies in the United States did not manufacture beauty sheet masks (Kim).

Beauty masks were manufactured in the United States, but they were nearly always in a jar with a thick paste-like form that needed to be applied by hand and cleaned off before use. On a special night, people might think about going through the entire process of wearing a beauty mask. Because they were so simple to use, Korean beauty sheet masks gained popularity in the United States. It required no washing; all you needed to do was remove it from the packaging, apply it to your face and wait for fifteen to twenty minutes. It was practical and could be incorporated into a person's everyday skincare regimen.

Eventually, all American beauty brands were producing these sheet masks, which were sold commercially everywhere. The technologies used to create these sheet masks were first used for medical bandages. The application of the technique to other manufactured goods that could be sold commercially to the public was altered by this technology, known as electrospinning. Cotton nanofibers are electro spun together to create a breathable material that can be applied to the skin to create beauty sheet masks. After that, they receive injections of liquid essence that has been specially created to target problem areas. Two techniques are employed to extract these liquids. Formula mechanical oil extraction is one of them and chemical oil extraction is another. Despite being more convenient, technologically advanced and popular with the public, these face masks have a negative environmental impact.

Results and Discussion

Beauty sheet mask materials

Because there are so many different products on the market, each with its own unique set of beauty-enhancing qualities, the mask can be made from a wide range of materials. Three commercially available cotton face masks ("Burt's bees/Hydrating sheet mask," "Peach slices hydrate mask" and "TONYMOLY I'm real sheet mask-Avocado") were cited to identify ingredients typical of this type of face mask in

order to focus the study. The types of materials used during a mask's life cycle were influenced by these ingredients. Waste cotton, linter for the sheet and the ingredients for the serum are the usual raw materials used to make masks. Glycerin, plant matter, sodium benzoate, sorbates, xanthan gum and disodium EDTA are the most often used ingredients in serums. Machines turn waste cotton and cotton linter into a pulp, which is then cleaned, bleached and spun into sheets before being cut into the shapes of the sheet masks. Steam distillation is a method that uses heat and water to extract the essential oil from plant matter.

Waste cotton, linter for the sheet and the chemical components of the serum are the raw materials needed to make a beauty sheet mask. Waste cotton can come from pre-consumer waste, like extra materials made to make fabrics or other textile products or post-consumer cotton waste, like discarded clothing. The fuzzy fiber that surrounds a cotton seed and is a byproduct of cotton cultivation is called linter. Preservatives, plant extracts and additional chemicals or liquids make up the serum, which gives the mask its cosmetic qualities.

Types of sheet masks:

Many types of fabric are used to make sheet masks.

Mass-produced mask fabrics made of coarse fibers are the most popular and least expensive. There are now more sophisticated mask fabrics with fibers made using biotechnology techniques.

Non-woven fabric: Fiber masks are made of a non-woven fabric with a rough texture that resembles paper in both feel and behavior. Fiber masks are incredibly affordable and can help your skin retain moisture. However, their paper-like texture lacks the "contouring" necessary to stay in place for very long and they evaporate very quickly. To prevent a low-quality fiber mask from falling off, you will need to lie down (Figure 9).



Figure 9: Non-woven mask.

Pulp: Although the texture of pulp masks is finer than that of fiber masks, the two types of masks share similar limitations. A pulp mask will fit somewhat unevenly, leaving visible spaces between the mask

and your skin (adhesion loss). The pulp mask's serum will evaporate rather quickly, just like it does with a fiber mask. One type of pulp-based mask is rayon cellulose (Figure 10).



Figure 10: Pulp mask.

Hydro-gel: High-end fiber and pulp masks are not as effective as hydro-gel masks. Usually, they are made as a "mask system," with the top and bottom halves applied independently. The production method that combines gelatin and cosmetic serums to give the mask the texture of a cool, thin film layer is the source of their product name. Because the fabric of hydro-gel masks is so thin and prone to tearing, they must be handled carefully (Figure 11).



Figure 11: Hydrogel mask.

Bio cellulose: Masks made of bio cellulose, a synthetic fiber with remarkable physical qualities, are regarded by skin care specialists and biochemists as the best option for moisturizing and healing skin. Because of their skin-tight dermal adhesion, bio cellulose mask fabrics effectively transfer cosmetic ingredients. A bio cellulose mask has a cool, moist gel-like texture, but its underlying structure is remarkably robust and resilient. When applied, bio cellulose masks don't dry out (Figure 12).



Figure 12: Bio cellulose mask.

Packaging

Beauty face mask packaging entails both wrapping each mask separately and shipping them all in bigger boxes for transportation. To combine the best structural, functional and barrier properties, the masks are usually wrapped individually in multilayer packaging, a composite material composed of layers of various plastics and paper. The two most often utilized materials in multilayer packaging are polyethylene and polypropylene. To be delivered to homes or retail locations, individual masks are wrapped in cardboard boxes, taped and loaded onto trucks. To create the cardboard boxes, softwood trees are chopped down and then chipped and pulped or recycled paper used in another way. Polypropylene plastic is also used to make the packing tape that is used to seal the boxes. Internal combustion engines, which rely on fossil fuels like gasoline, are commonly used by trucks that deliver the masks. Following distribution and packaging, customers use the beauty sheet masks just once before discarding them (Figure 13 and Table 1).



Figure 13: Face sheet mask packaging.

Brand/Product	Launch year	Key features	Technology	Ingredients	Target benefits
Neutrogena MaskiD	2019	Personalized 3D-printed sheet mask, customized using skin data from Neutrogena's Skin 360 tool	3D printing skin data analysis using proprietary algorithms	Dermatologist recommended ingredients for specific facial zones	Precise treatment for targeted skin concerns
Amorepacific custom 3D printed mask	2020 (approx.)	Tailored mask using facial scans and 3D printing to apply specific ingredients	3D printin4 custom facial scans	Hydrating formulas, anti-aging treatments, skin-tone correctors	Customized treatment for hydration, anti-aging tone correction
Celderma undermask	2021	Designed for use under PRE masks, includes soothing ingredients to prevent irritation	Hydrogel mask	Allantoin, tea tree extract	Soothes and cools skin, prevents irritation under PPE masks
Societe rejuvenating peptide mask	2018 (approx.)	Hydrates, smooths fine lines, and regenerates skin	Traditional sheet mask with advanced skincare ingredients	Peptides, hydrolyzed collagen, Chamomile flower extract	Hydration, anti-aging, and skin regeneration
HETIME revitalizing and hydrating face mask	2020 (approx.)	Tailored for men with thicker, oilier skin, uses biodegradable cellulose fiber	Biodegradable cellulose fiber	Moringa leaf, cedar oil, Baobab tree oil	Purifies and hydrates men's skin
Nanofiber masks	2021 (approx.)	Encapsulates active ingredients in nanofibers for rapid absorption, dissolves upon contact with moisture	Nanofiber technology, rapid absorption	Active ingredients encapsulated within nanofibers	Quick, efficient delivery of nutrients to the skin

Table 1: Innovation in face sheet masks.

Collaborations

In 2014, L’Oreal acquired Magic Holdings International (MG) and established the first Mask Research and Development Centre in China. Leveraging L’Oreal's advanced research and technology, MG has led the market with pioneering innovations such as the fresh-mix mask and

the milk whitening mask.

In 2017, China-based grand fan group acquired the Cicabel brand from French manufacturer Santinov. Shortly after, CICABEL introduced a peptide-based facial mask built on Santinov's biomedical technology. This three-step revitalizing and hydrating mask utilizes

stem cells to activate skin regeneration, nourish the dermis and promote the creation of new cells, delivering deep hydration and rejuvenation.

In 2019, Amorepacific acquired Cube Me, a supplier of collagen, hyaluronic acid and vitamins and subsequently launched its Laneige brand. The leading Korean beauty company also expanded its luxury offerings with the Lab Tailored 3D Mask and announced a minority investment in the Australian luxury skincare brand rationale group (Figure 14).



Figure 14: Loreal acquiring magic holdings.

Current market

The global sheet face mask market is expected to reach about \$712.3 million by 2032, growing at a Compound Annual Growth Rate

(CAGR) of 6.8% over the next ten years from its estimated \$386.8 million in 2023. Growing consumer interest in skincare, convenience and the advantages sheet masks provide like hydration and detoxification are driving the market's growth. Growth is also fueled by advancements in mask ingredients like seaweed and snail extracts, as well as growing demand for eco-friendly materials and increased awareness of personal appearance. Important market trends include the rise in demand for customized skincare products and the move toward online distribution, particularly in the wake of the COVID-19 pandemic. To promote their goods, big companies like L'Oreal, Johnson and Johnson and Unilever are using social media and celebrity endorsements. Additionally, businesses can provide specialized sheet masks that are suited to particular skincare requirements thanks to technological advancements like the use of sophisticated systems to analyze skin conditions (Figure 15 and Table 2).

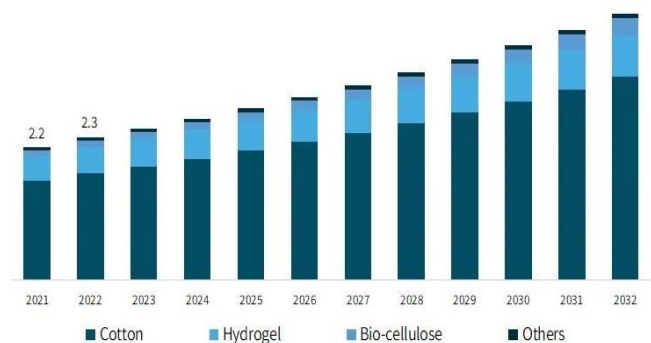


Figure 15: Current market of sheet masks.

Brand	Product	Key features
SK-II	Pitera facial treatment mask	Made from Pitera (fermented yeast), contains vitamins, amino acids, minerals; brightens skin, reduces fine lines and dark spots, improves complexion, targets large pores and uneven tone
TAIKI	Probiotic sheet masks	Promotes healthy skin microbiome, uses probiotic extracts and microbial fermentation metabolites like bifidobacteria; hydrates and reduces skin sensitivity
MOIA ELIXIRS	CBDerma-repair nano-fiber mask	100% biodegradable mask with CBD, vitamins C and E, hyaluronic acid, PHA gluconolactone; offers long-term hydration, improves elasticity, and reduces wrinkles
GO GREEN HEMP	CBD-infused face mask	Biodegradable cellulose mask with hemp oil (no THC); hydrates and protects sensitive skin, counters pollution and sun damage, absorbs 50% more moisture than cotton
BIOEFFECT	Imprinting hydrogel mask	Provides intense hydration, enhances effects of Barley EGF treatments by delivering Epidermal Growth Factors (EGF); promotes skin rejuvenation
DR. JART	Dermask vital hydra solution deep hydration mask	Patented plant-based glucose and xylitol; intense hydration, made from fine cellulose fiber for enhanced nutrient absorption
DR. JART	CRYO RUBBER™ Firming collagen mask	Inspired by cryotherapy, contains collagen and Carob fruit extract; cools skin, boosts blood flow, firms skin, reduces wrinkles, and promotes collagen production

SEPHORA STARSKIN	The Diamond mask	Bio-cellulose mask with coconut juice, diamond dust, primrose extract, and emerald/tourmaline extracts; revitalizes skin, brightens complexion, evens out skin tone with mulberry bark
AKIMIA	Electronica microcurrent sheet mask	Uses iontophoresis and printed battery technology to deliver ingredients deeper into skin, improves serum absorption, promotes hydration, and skin recovery

Table 2: Different brands manufacturing face sheet masks.

Conclusion

- **Wasteful and single use:** Beauty sheet masks and their packaging are made to be used just once and should be thrown away after use. Because it is difficult to separate its components, the packaging, which is composed of multilayer materials, cannot be recycled.
- **Additives that harm the environment:** Preservatives used in masks, such as potassium sorbate, sodium benzoate and essential oils (like rose oil), can harm the environment. Limited skin benefits: Sheet masks work best to nourish the skin, but they are less useful for deep cleaning or exfoliation.
- **Poor biodegradability:** Certain substances, like EDTA, are difficult to break down and can contaminate the environment, particularly in water systems.
- **Inefficient resource use:** Some ingredients require a lot of natural resources which puts more stress on the environment.

References

1. Rudolf A, Sterman S, Cupar A (2024) Development of a textile sheet mask design for facial care based on a 3D face model of an average woman. J Eng Fibers Fabrics 19.

2. Zhou L, Chen J, Chen T, Chang H, Cui W, et al. (2022) Investigation of actual exposure to facial sheet mask preceding its risk assessment. Sci Rep 12: 1215.

3. Morganti P, Morganti G, Chen HD, Gagliardini A (2019) Beauty mask: Market and environment. J Clin Cosm Dermatol 3.

4. Janssens-Bocker C, Wiesweg K, Doberenz C (2023) Exploring the therapeutic potential of algae-based sheet masks in skincare: A comprehensive study of cosmetological benefits and microbiome balanced interactions. J Cosmet Dermatol Sci Appl 13: 277-301.

5. Matuschek C, Moll F, Fangerau H, Fischer JC, Zanker K, et al. (2020) The history and value of face masks. Eur J Med Res 25: 23.

6. Militky J, Novak O, Kremenakova D, Wiener J, Venkataraman M, et al. (2021) A review of impact of textile research on protective face masks. Materials 14: 1937.

7. Geczy A, Havellant G, Batorfi R, Skwarek A, Dusek K, et al. (2023) Filtering efficiency of sustainable textile materials applied in personal protective face mask production during pandemic. Materials 16: 903.

8. Rountree M (2024) A dry sheet mask that loves your skin (and the planet).