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Development Of Cosmetotextile Product for Skin Protection

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ABSTRACT: The proposed project introduces an innovative solution to enhance foot care comfort through moisturizing heel patch socks. Traditional socks often neglect the specific needs of the heels, resulting in dryness and discomfort. The proposed solution integrates a specialized moisturizing patch directly into the heel area of the socks, ensuring continuous hydration and nourishment for the skin. The patch is infused with moisturizers and skin-replenishing ingredients, providing targeted relief for dry, cracked heels. Through this design, users can effortlessly incorporate foot care into their daily routines, promoting healthier, more comfortable feet. This presentation will discuss the development process, key features, and potential benefits of our moisturizing heel patch socks, addressing the growing demand for convenient and effective foot care solutions in today's market.

KEYWORDS: Cosmetotextiles, Heel cracks hydration, Microencapsulation, Vitamin E, Hyaluronic acid.

I. INTRODUCTION

Technologies established in the last two decades gave rise to the development of sophisticated technical textiles, such as breathable textiles, sensing textiles, medical textiles, antimicrobial textiles, and more recently, cosmetotextiles. Cosmetotextiles combine textile materials with cosmetic active substances. The cosmetic substance is affixed to the fabric of clothing or bedding so that when in contact with the human body and skin the active substance is transferred from the textile onto the skin for cosmetic purposes. Current cosmetotextiles in the market claim to be moisturizing to improving the firmness and elasticity of skin or reduce the appearance of fine lines and wrinkles. This paper describes the microencapsulation technologies of cosmetotextiles, discussing the choice of active components and end uses.

Microencapsulation method to coat the material. Microencapsulation is a process in which tiny particles or droplets of one substance are surrounded or coated by a protective material, creating microcapsules. These microcapsules can vary in size from a few micrometres to several millimetres. The purpose of microencapsulation is to protect, isolate, or control the release of the core material. In this we use a type Coacervation, is a phase separation technique used in microencapsulation to create microcapsules. In this process, two immiscible (unmixable) liquids are mixed: one is the core material (the substance to be encapsulated), and the other is a coating material that is typically a polymer. When specific conditions, such as changes in temperature, pH, or the addition of a coacervating agent, are applied, the polymer in the mixture undergoes phase separation.

II. RELATED WORK

Objective:

- To Study and Analyze the various reasons for Skin Damage.
- To create a Textile product to moisturizing the skin and prevention of skin dryness
- To Replace the Traditional way of application of active components in the forms of Creams and Lotions

Background Of the Study:

- A survey is conducted to examine people's skin issues, their expectations for skin care products, and what textile products should be developed in cosmetotextiles.
- The findings indicate that the majority of people experience skin issues connected to skin breakouts, and that moisturizing and UV protection solutions are needed.
- Given the abundance of cosmetotextile goods connected to UV protection, we intend to create one that focuses on skin moisturization.

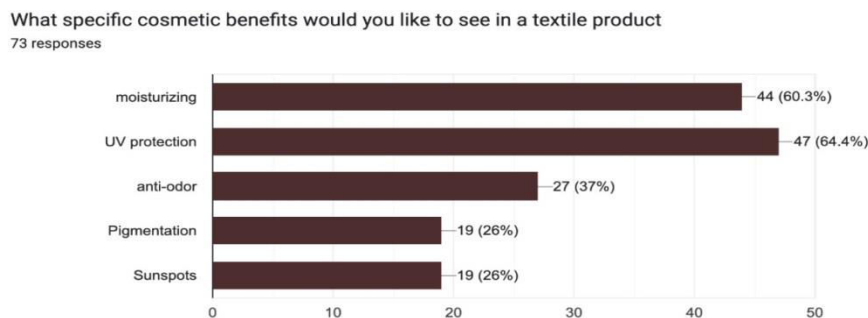


Figure 1. Survey results of need for which cosmetotextile product

Need For Project Work:

- **To improve hydration and prevent dryness:** Cracked heels are a common problem, especially in dry climates or for people who wear shoes without socks. Cosmetotextile materials may be chosen for their ability to hold moisture and deliver it to the skin.
- **To soothe and soften rough heels:** Exfoliating materials might be incorporated into the heel patch of the socks to help remove dead skin cells and soften rough heels.
- **To deliver nutrients and other skin-beneficial ingredients:** Cosmetotextile materials may be chosen for their ability to absorb and slowly release ingredients such as vitamins, oils, or other skin-beneficial ingredients.
- **For comfort and ease of use:** Socks are a convenient way to deliver moisturizing and other benefits to the heels. Cosmetotextile materials may be chosen for their comfort and breathability.

III. LITERATURE REVIEW

This paper mentions human skin dryness caused by environmental dryness in autumn and winter. The application of hyaluronic acid to a fabric provides a hydrating effect, which can increase the fabric's wearing comfort. The face yarn was made of hyaluronic acid viscose fiber, graphene viscose fiber, nylon, and viscose with varying interweaving ratios, while the inside yarn was made of nylon/spandex-coated wire.[1] before and after the fabric was coated on human skin, the impacts of the fabric's structure and raw ingredients on the skin's moisturizing qualities were investigated and examined. The fabric's ability to moisturize human skin is reduced when the ratio of hyaluronic acid viscose fibers in the weave drops.

Antioxidant cosmetotextiles: Cotton coating with nanoparticles containing vitamin E

This study explored the functionalization of cotton fabrics to impart them with antioxidant properties. Protein-based nanoparticles incorporating vitamin E (tocopherol) in their composition were efficiently coated onto cotton fabrics by the pad-cure methodology. Different techniques including SEM, FTIR, dyeing, and air permeability confirmed and validated the uniformity of the coating and the efficiency of the pad-cure method. The release profile of vitamin E showed an initial burst.[2]

Microencapsulation and its application in production of functional textiles The microencapsulation technique is one of the advanced technologies which has been used to impart functional properties such as antibacterial activity, aroma, mosquito repellence, UV protection, and thermoregulation to textiles. In microencapsulation, the volatile and non-volatile components can be encapsulated within a thin polymeric layer which causes a slow release of the compound, resulting in long-lasting functional effect. Various active materials, like essential oils, enzymes, drugs, pesticides and vitamins, have been successfully entrapped inside microcapsules made from a variety of polymeric materials. There are interesting reports available in the literature dealing with functionalization of textiles using microencapsulated materials. [3]

This review paper covers the fundamentals of microencapsulation, its major techniques, materials involved in microencapsulation and the important research reported in this area. The major essential oils used in microencapsulation and the subsequent functional effects are also reviewed. The present and futuristic research trends in this important area of chemical processing of textiles are presented. [4]

Cosmetic textiles with biological benefits: Gelatin microcapsules containing Vitamin C

Gelatine microcapsules containing vitamin C were prepared using emulsion hardening technique. Both the optical microscopy and scanning electron microscopy demonstrated that the newly developed microcapsules were in the form of core-shell spheres with relatively smooth surface. The particle size of microcapsules ranged from 5.0 to 44.1 μm with the average particle size being 24.6 μm . The gelatine microcapsules were proved to be non-cytotoxic based on the research findings of the toxicity studies conducted on human liver and breast cell lines as well as primary bone marrow culture obtained from patient with nonmalignant haematological disorder. The gelatine microcapsules were successfully grafted into textile materials for the development of cosmetic textiles.[5]

Fixation of vitamin E microcapsules on dyed cotton fabrics

The fixation of vitamin E microcapsules was carried out by pad-dry-cure method on dyed cotton knit. Cotton knit was dyed with natural indigo, and subsequently treated with microcapsules containing vitamin E. In order to improve the hand of the microcapsules-treated fabric, a softener was treated in a simultaneous step with microcapsules or in a separate step after dyeing process.

It was confirmed by SEM analysis that microcapsules were fixed on cotton fibres. Melamine–formaldehyde microcapsules containing vitamin E was stable during the process of repeated washing, rubbing and ironing. LC–MS analysis indicated that the amount of vitamin E decreased gradually with elapsed time. [6]

IV. METHODOLOGY

Steps Involved In Methodology:

- Analysis of the Skin Problem
- Selection of Suitable active Ingredient to treat the Problem
- Selection of Suitable fabric
- Selection of Suitable Technology for Finishing
- Finishing the Product
- Wearer Trial
- Product Survey

MATERIALS:

Hyaluronic acid and vitamin E were chosen after thorough research on skin types and sensitivity for creating moisturizing cosmetotextile products.[9]

METHODS:

Microencapsulation by coacervation involves the formation of a liquid droplet surrounded by a polymer membrane through phase separation in a solution which is known as coacervation[13]. This process encapsulates active ingredients within the droplet, offering protection and controlled release, ideal for applications such as drug delivery and flavor masking in the food industry.[12]

PROCESS:

- Microencapsulation was achieved using Hyaluronic Acid (HA) and vitamin E as the core materials, and gum Acacia Willd. as the wall material.
- Initially, 10g of wall material was swollen in 100ml of hot water for 30 minutes Subsequently, 5ml each of hyaluronic acid and vitamin E were added and stirred at 300rpm.
- Drop-wise addition of 20% sodium sulphate solution (10ml) was performed for 5-10 minutes, followed by the addition of 5ml of 17% glutaraldehyde.
- Finally, cotton viscose single jersey knitted fabric was immersed in the microcapsule solution followed by its application onto fabric using pad-dry- cure method.

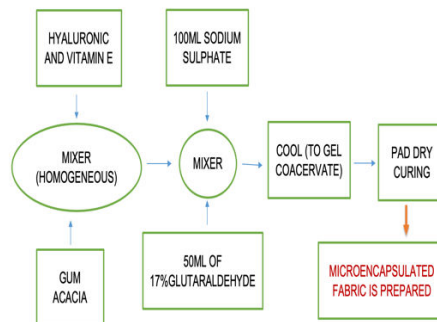


Figure. 2. Block Diagram of the process of microencapsulation

V. EXPERIMENTAL RESULTS

Results:

- Microencapsulation of VITAMIN E and HYALURONIC ACID is done.
- It is found that they exhibit potential for moisturizing properties.
- The SEM studies reveal the presence and alignment of microcapsules on the fabric.
- The anticipated outcome of implementing a moisturizing heel patch within socks is the provision of continuous hydration and nourishment to the heels, thereby alleviating dryness and discomfort.

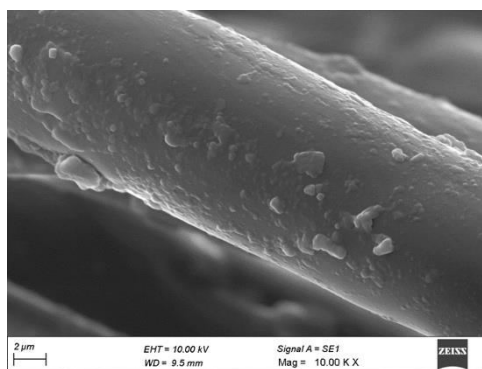


Figure. 2. SEM Image of sample

VI. CONCLUSION

This helps promote a softer, smoother, and healthier skin on the heels, ultimately enhancing overall foot comfort. Additionally, by integrating foot care into daily routines, users are expected to experience improved foot health and enhanced comfort throughout the day.

Field trail result reveals that the garment moisturize skin to some extent.

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