Press Release

Research and Development

Shiseido developed new technology for sunscreen, "Automatic Veil Technology", to automatically repair micro-level nicks and scrapes and unevenness

- Prevent reduction in UV protection function due to contact with fingers -

Shiseido successfully developed " Automatic Veil Technology", a revolutionary technology that allows application films with ultraviolet (UV) protection function such as sunscreen to automatically repair nicks and scrapes and unevenness. It is known that the UV protection function of sunscreen becomes lower in areas where the thickness of the application film is reduced due to " nicks and scrapes" and " unevenness" that result from contact with fingers or expressive motions of the face. By incorporating a combination of powder dispersants that contain the company's uniquely developed ingredients, this technology endows the application film with optimized fluidity without solidifying it completely, thereby allowing it to automatically repair micro-level nicks and scrapes and unevenness. This makes it possible to prevent reduction in UV protection function caused by contact with fingers.

In addition to previous technologies Shiseido has developed, such as those aimed at enhancing the UV protection function of application films when they come into contact with water, sweat, and heat or converting a portion of sunlight into skin-beautifying light, the application of the present technology will further advance our sunscreen products. Moving forward, Shiseido will continue to work towards a future in which customers can enjoy their daily lives expressively and more actively and freely under the sun.

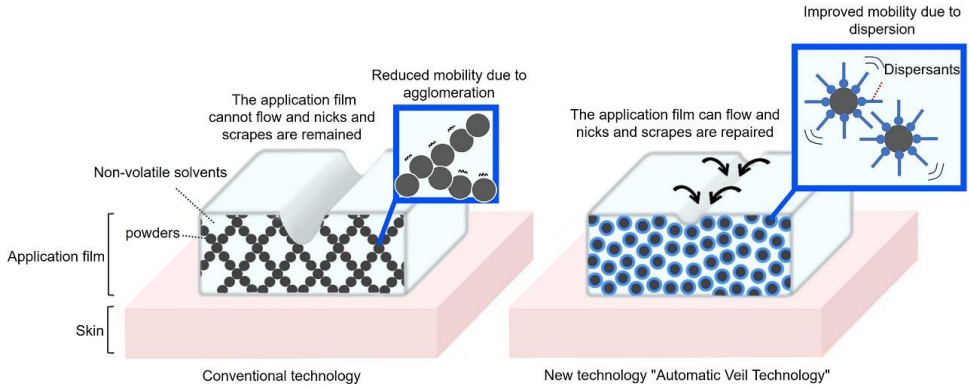

Figure 1. Automatic Veil Technology for automatic repair of nicks and scrapes and makeup separation on application film (conceptual diagram)

Research background

Since the days when the effects of UV on the skin were still not widely known, Shiseido has undertaken studies on UV protection as one of the first to embark on this field of research, working on innovative technology development on a continuous basis to address the needs of customers to thoroughly protect their skin from adverse effects of UV rays in various environment, from everyday life to harsh UV conditions. In 2014, the company developed a technology that enhances the UV protective veil of the application film when it comes into contact with water and sweat, which had previously been considered enemies of UV protection.[*1] This was followed by the development of a technology that instead uses heat such as sunlight to strengthen the UV protective veil in 2019[*2]. Furthermore, in 2021, Shiseido introduced a technology to convert a portion of sunlight into skin-beautifying light, which has a favorable effect on the skin, leading to the realization of beauty while harmoniously coexisting with the environment rather than

simply escaping from environmental threats [*3].

The present study was carried out with a focus on the long-standing problem of sunscreen, that is, the reduction of UV protection function resulting from contact with fingers or expressive motions of the face, which lead to unevenness of the film. A phenomenon in which something damaged is automatically repaired is called "self-repairing," and the company has been conducting research on this topic for many years. However, many of components suitable for auto-veil function make the film uneven when applied to the skin because they are elastic and difficult to spread, which is problematic as this prevents them from fully demonstrating UV protection function. Therefore, to develop a technology that allows the formulation to spread evenly while also facilitating auto-veil of defects on the application film, they focused on the optimization of the flow properties of the film.

*1 Shiseido succeeds in developing the new technology "WetForce", an innovative sunscreen that, for the first time in the world, "increases rather than decreases the UV protection effect when it comes in contact with water and sweat"! (2014)
https://corp.shiseido.com/jp/newsimg/archive/00000000001735/1735_b5z78_jp.pdf
*2 Shiseido Develops World's First "Technology that Increases UV Protection Effect with Heat" (2019)
https://corp.shiseido.com/en/news/detail.html?n=00000000002772
*3 Shiseido develops innovative technology to convert ultraviolet light into light that brings about beneficial effects on the skin (2021)
https://corp.shiseido.com/en/news/detail.html?n=00000000003256

Development of "Automatic Veil Technology"

In order to increase the fluidity of the application film, it is usually necessary to reduce the amount of powder or increase the amount of non-volatile solvent, which, however, makes the film more prone to adhering to fingers and giving the sticky feeling at the time of use. To solve this problem, we investigated ways to improve powder agglomeration, which results in reduced fluidity. As a result, we incorporated the latest knowledge from powder dispersion research into the knowledge the company has accumulated in the field of materials science and found that certain powder dispersants can improve the dispersibility of powder in the application film, thereby making the application film fluid. This finding led to the successful development of "Automatic Veil Technology", a new technology to auto-veil micro-level nicks and scrapes and unevenness (Figure 2). Microscopic observation also showed that scrapes on the application film was automatically repaired(Figure 3).

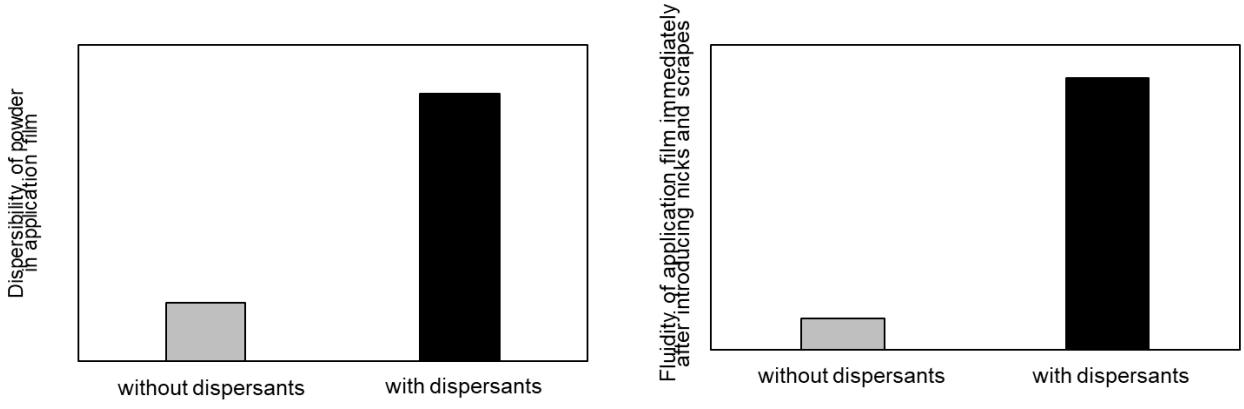

Figure 2. Powder dispersants improve the dispersibility of the powder in the application film and increase the fluidity of the application film

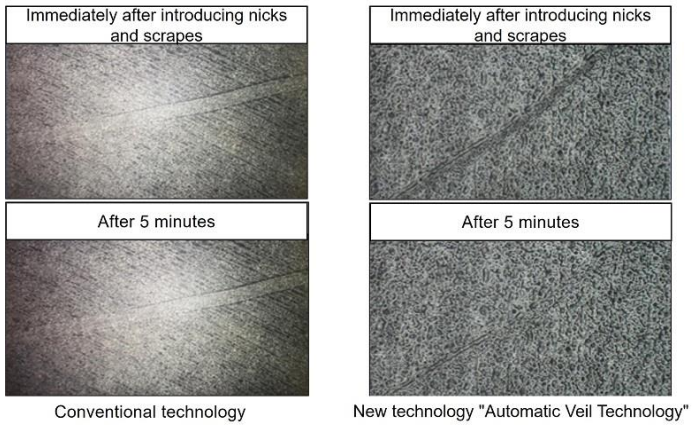

Figure 3. Images showing how the application film with Automatic Veil Technology quickly repairs micro-level scratches on the film (Microscopic observation)

Effects of Automatic Veil Technology

Using an application film with Automatic Veil Technology, we examined whether recovery of UV protection function is enhanced under actual conditions (in vitro). The recovery of UV protection function was confirmed within 5 minutes after introducing nicks and scrapes to the application film, which had become fluid by means of Automatic Veil Technology (Figure 4). In addition, it was confirmed that the film is less prone to sticking to fingers as compared with the application film which was made fluid by the conventional method（Shiseido's existing method）, and the amount of decrease in UV protection function was also reduced (Figure 5).

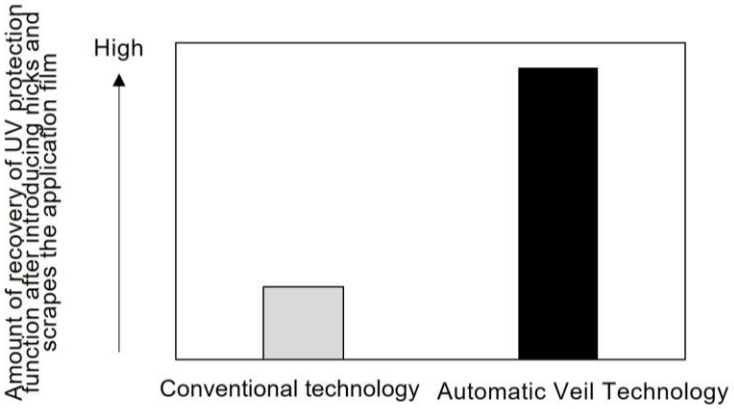

Figure 4. Automatic Veil Technology enhances recovery of UV protection function

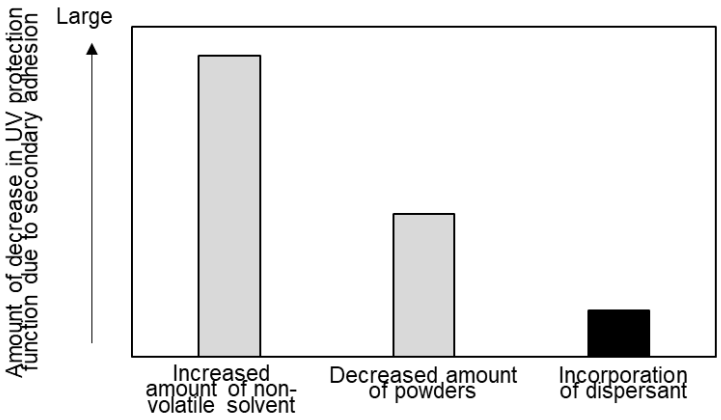

Figure 5. Automatic Veil Technology which uses dispersants as the fluidization method, reduces the amount of decrease in UV protection function and makes the film less prone to sticking to fingers compared with the conventional methods

Future prospects

In addition to the application to sunscreen products, Automatic Veil Technology is expected to contribute to keeping the beautiful finish of base makeup products and lip products. Going forward, Shiseido will further accelerate the development of sunscreen technology based on the knowledge and technology in the field of materials science, which is the company’s strength, and aim to create a world where more and more people can live actively under the sun.

About Our R&D Strategy:

Based on "Skin Beauty INNOVATION," one of the three pillars of Shiseido's R&D strategy, we conducted the present study in the field of "cosmetic formulation technology," which pursues and realizes the value of cosmetics our customers desire, through materials science which we consider is our strength.

- Integrated Report 2022 (Beauty Innovation)

https://corp.shiseido.com/report/en/2022/value_creation/innovation/

- Keywords

Skin Beauty INNOVATION, sun protection

<Reference>

Researchers' challenges

■R&D Philosophy "DYNAMIC HARMONY" approach

This research was carried out under the Functionality/Japan Quality approach of Shiseido's R&D philosophy, DYNAMIC HARMONY. By applying powder dispersion technology, we realized the function of the sunscreen formulation to auto-veil the application film as well as the comfortable texture when applied to the skin.

Researcher Yoshiro Sadakami

■"We will not give up providing our customers with a comfortable texture when using our products," the commitment of researchers who fulfilled their long-held dream: the Automatic Veil Technology.

The formulation of the auto-veil function was extremely difficult at first due to the problem of coating unevenness, but we were particular about how comfortably and pleasantly our consumers could use our sunscreen product, so we continued to explore new technology without giving up. In addition to auto-veil function, we also sought to fulfill the needs that the product is expected to satisfy, i.e., it isn't sticky so much, and it provides a pleasant feel when using. To this end, we repeated more than a few hundred trial and error attempts with members involved, and finally, we discovered that it is possible to realize the technology by incorporating specific powder dispersants.

Shiseido's R&D Philosophy "DYNAMIC HARMONY"

Shiseido Formulates Its Unique R&D Philosophy "DYNAMIC HARMONY" (2021)

https://corp.shiseido.com/en/news/detail.html?n=00000000003252

DYNAMIC HARMONY website:

https://corp.shiseido.com/en/rd/dynamicharmony/