MILBON

News Release

April 27, 2019

Successfully Established New Formulation Technology Focused on the Structure of Organogel

~Development of Formulation Maintaining Intended Feeling of use Regardless of Changes in Temperature~

The Milbon Co., Ltd. (President and CEO: Ryuji Sato) has successfully established new formulation technology focused on the structure of Organogel*.

"Organogel" indicates a substance other than water that has been rendered into a solid, such as liquid oil or ethanol. The formulation for Organogel in the past has faced the issue of the feeling of use (hardness, elasticity, coating properties, finish) changing depending on the temperature. The cause of this issue is that the structure of Organogel is particularly susceptible to changes in temperature, which cause it to break down. This new technology now successfully uses specific rice bran wax*1 to create Organogel with a structure that stays stable even if the temperature changes. The use of this technology now makes it possible to develop a formulation that will maintain a fixed feeling of use regardless of temperature. It is our intention to make use of this technology in Milbon products in the future, starting with a styling product scheduled for nationwide launch in Japan in summer 2019. Furthermore, the results of this research have been externally reported as shown below.

*Patent applied for

Conference Release

Released At: The 99th CSJ Annual Meeting (2019)

Release Title: Thermal properties of organogel prepared by a rice bran wax using polarizing microscopy, rheology measurements and DSC, and its application in cosmetics

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Research Background

One particular cosmetics formulation, "balm," is generally formulated using an Organogel. Excelling at bringing a shine and moisture to hair and the skin, it is used in many cosmetic products. Furthermore, in recent years, customers have become more interested in naturally derived ingredients, considering they are friendly on the environment and on people, and due to this reason balm making use of the naturally derived oil solid "beeswax"*2 has seen growing support. However, balm made using beeswax suffers from the issue of its feeling of use changing depending on the temperature, including becoming soft and partially melting in summer, and becoming hard and difficult to get out of the container in winter. The cause of this issue was the structure of the formulation changing under the influence of temperature, and so maintaining stable feeling of use proved difficult. That was why Milbon aimed to resolve the changes in feeling of use due to temperature while also responding to customers' interest in natural ingredients, setting about the development of a formulation that sees less changes in structure due to temperature.

Research Results

~ Discovery of the naturally wax “rice bran wax” to solidify liquid oil ~

The results of a search for a natural ingredient that could solidify liquid oil led to the discovery that only small quantities of a specific rice bran wax can solidify a large volume of liquid oil. When 3% rice bran wax and 97% liquid oil are heated, melted together and then cooled to room temperature, it was confirmed that the resulting mixture forms an Organogel that does not flow even when placed on a tilt (Fig. 1). Furthermore, this Organogel has the same appearance as at 25℃ even when stored at 50℃. On the other hand, in the case of beeswax the mixture melts at 50℃ when at a concentration of 10% or less, and a formulation of 15% or more of beeswax is required in order to prevent it from flowing at 50℃. Therefore, we considered that the rice bran wax Organogel that didn’t flow even at 50℃ had a specific structure, and conducted further experiments.

The following experiments were carried out using an Organogel formulated with 5% rice bran wax and an Organogel formulated with 20% beeswax, for which instrument measurements indicated samples were a similar hardness at 25℃.

~ Structural composition of formulation using rice bran wax and evaluation of feeling of use ~

First, in order to confirm the state of the Organogels at different temperatures, polarization microscopy*3 was performed, a process capable of allowing the internal structure of the gel to be observed. The results made clear that the Organogel using rice bran wax has a regulated structure, and can remain as regulated in the range between 10℃ and 50℃. On the other hand, it was also confirmed that the regulated structure of the Organogel using beeswax as seen at 25℃, attenuate to a remarkable degree when at 50℃ (Fig. 2). This experiment proved that Organogel formed using rice bran wax has a stable structure in regard to changes in temperature. Leading on from these results, we believed it highly likely that a stable structure would allow feeling of use to be maintained, and so implemented a tactile evaluation of the Organogel.

The results of the tactile evaluation allowed us to confirm that the feeling of use of the Organogel formed using rice bran wax was more resistant to change due to temperature than that formed using beeswax, (Fig. 3). Furthermore, in order to quantitatively prove that feeling of use was being maintained, we conducted a dynamic viscoelasticity measurement*4. The results of these measurements displayed that the Organogel formed using rice bran wax had smaller changes in hardness due to temperature (Fig. 4).

The above experiments have revealed that rice bran wax can form an Organogel not only using less volume than the standard-use beeswax, making it more high performance, but that is also stable in relation to temperature. They have also made clear that Organogel formed using rice bran wax can maintain feeling of use even during changes in temperature because it forms a structure that is stable in regard to temperature.

Terminology

*1 Rice Bran Wax

A solid wax obtained from rice bran.

*2 Beeswax

A solid wax obtained from honeybee hives.

*3 Polarization Microscopy

A method to observe whether a given subject is birefringent, such as crystal or liquid crystal. In this research, it was used to evaluate whether the formulation was a structure with regularity.

*4 Dynamic Viscoelasticity Measurement

A method to measure the mechanical properties of a substance, such as elasticity and viscosity. In this research, it was used to quantify the hardness of the formulation. The larger the value the harder the substance, and the smaller the number the softer.

Reference Materials

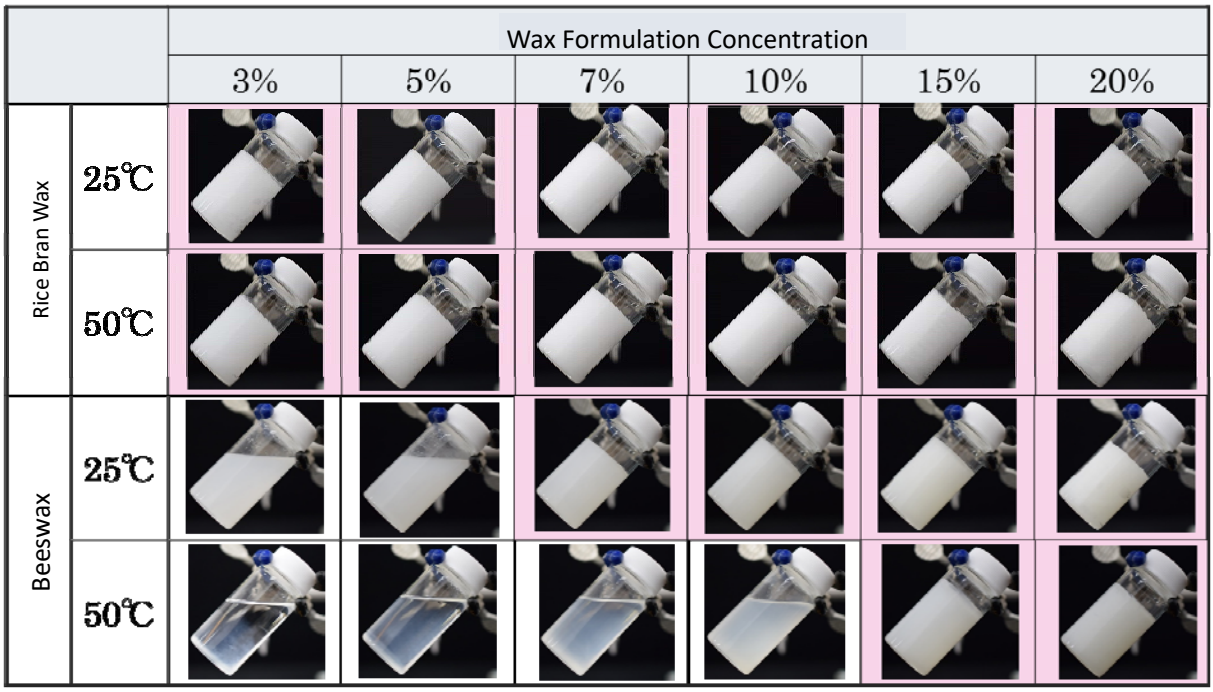

Fig. 1 State of each sample at specific temperatures for each wax formulation concentration

Samples were first stored at the specific temperatures for 24 hours, then tilted to 45 degrees and photographed.
The samples that were solid are indicated in red.

A formulation of 3% or more of rice bran wax forms a solid Organogel that does not flow at 25℃ or 50℃.

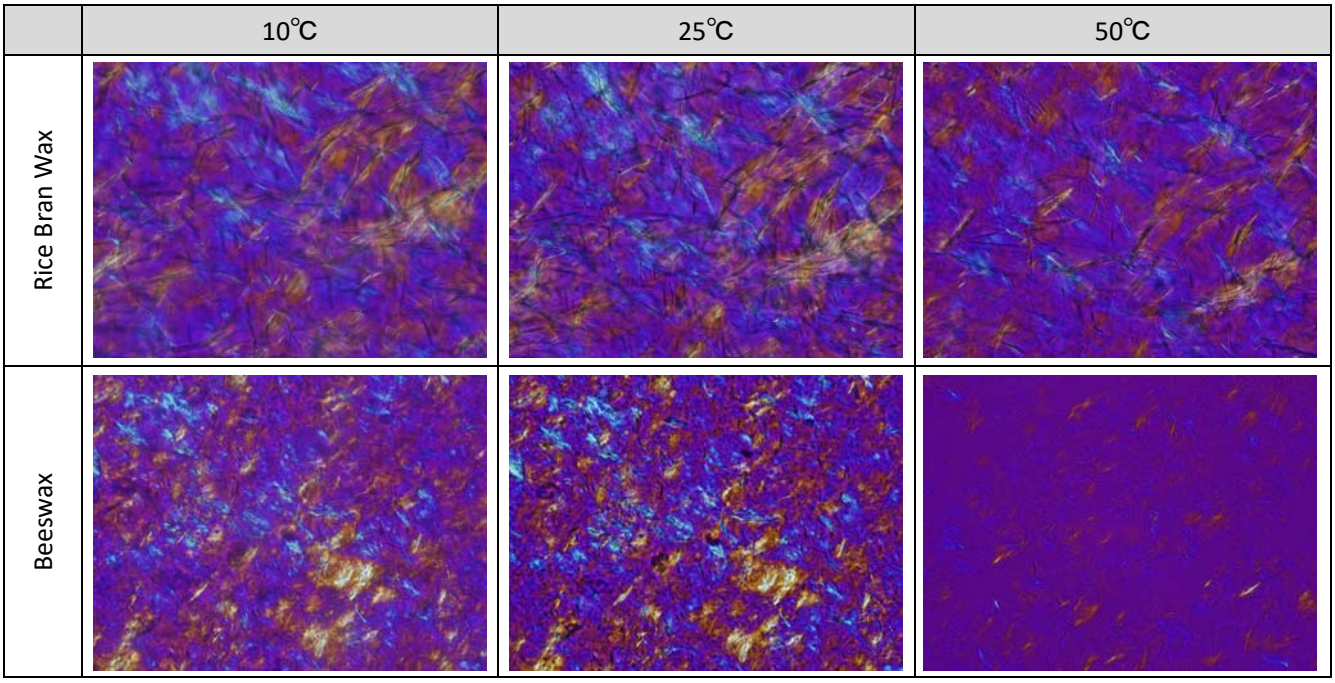

Fig. 2 Changes in the structure of Organogel due to temperature

Organogel formulated with 5% rice bran wax and Organogel formulated with 20% beeswax, both of similar hardness at 25℃, were observed using a polarizing microscope. Regularity in structure is indicated by yellow and blue in the images.

The Organogel formed using rice bran wax maintains a regulated structure, as displayed by yellow and blue, at 10℃, 25℃, and 50℃.
The regulated structure of the beeswax Organogel, as displayed by yellow and blue, has completely vanished at 50℃.

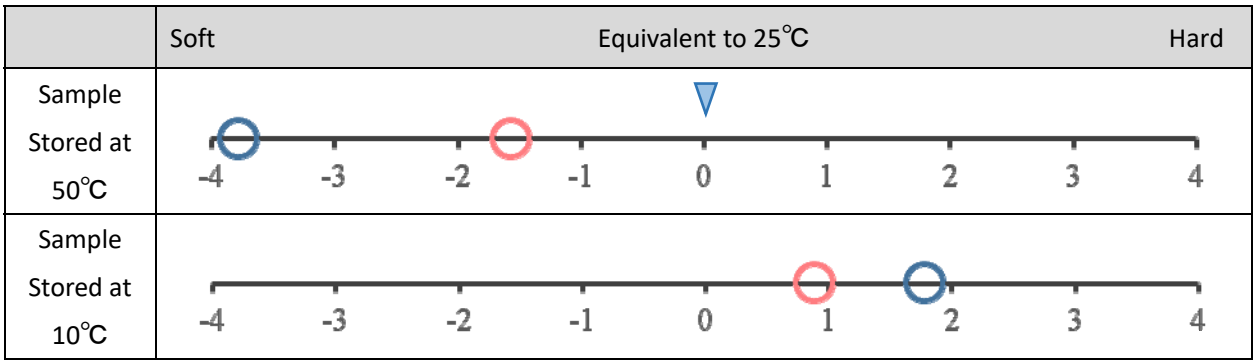

Fig. 3 Tactile changes in Organogel due to temperature (○: Rice Bran Wax 5%, ○: Beeswax 20%)

A panel of 8 people evaluated the hardness when taking the samples out of the jar cup using their fingertips, (image right). Taking the hardness at 25℃ as the standard, sample tactile changes were evaluated at 50℃ and 10℃.


The tactile evaluation

There is only slight tactile change in Organogel formed using rice bran wax at 50℃ and at 10℃.

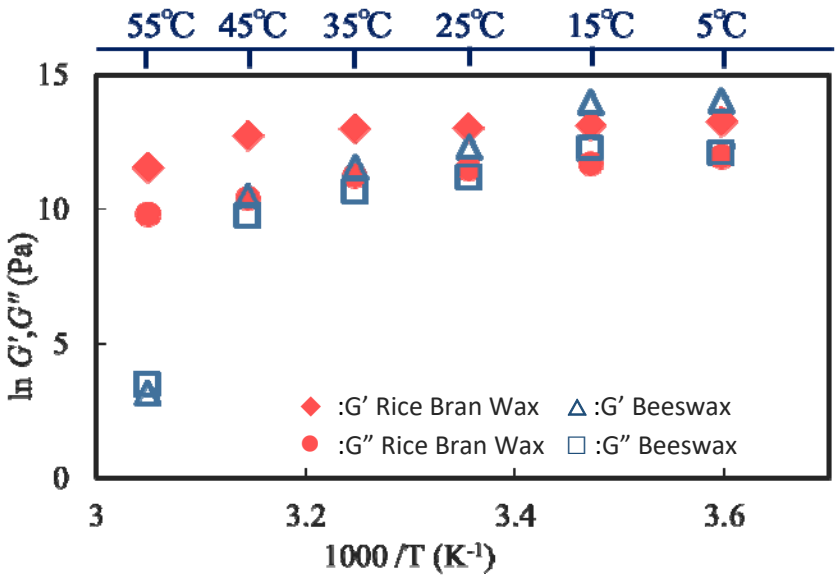

Fig. 4 Changes in Organogel dynamic Viscoelasticity due to temperature

Plotted with the results of dynamic viscoelasticity measurements against temperatures for Organogel formulated with 5% rice bran wax and Organogel formulated with 20% beeswax.

This displays that organogel formed using rice bran wax has smaller changes in hardness due to temperature.

■**For inquiries relating to this press release**

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