

Shiseido Develops a Novel Emulsification Technology, "Core-Corona Emulsification" That Offers Versatility in Mixing Oil and Water

Shiseido Company, Limited (Shiseido) has developed a novel "core-corona emulsification" technology that allows versatility in mixing oil and water. This technology gives freedom in choice of oil and its composition ratio for emulsification without using surfactants, which are commonly used in the conventional emulsification technology (Figure). This new technology is expected to offer innovative cosmetics formulations such as "sunscreen with a dewy refreshing texture and high water-resistance" and "highly effective moisturizing cream without a sticky feel" – functions that were hard to balance with conventional technologies.

This new technology was presented at the 68th Divisional Meeting on Colloid and Interface Chemistry on September 7, 2017 in Kobe, Japan and at the 56th Annual Meeting of the Japan Oil Chemists' Society on September 11, 2017 in Tokyo, in which a Shiseido researcher, Ms. Yuki Sugiyama received the Young Researcher Encouragement Award of Japan Oil Chemists' Society, Kanto branch. The new emulsification technology will be applied to selected ANESSA products to be launched in February 2018.

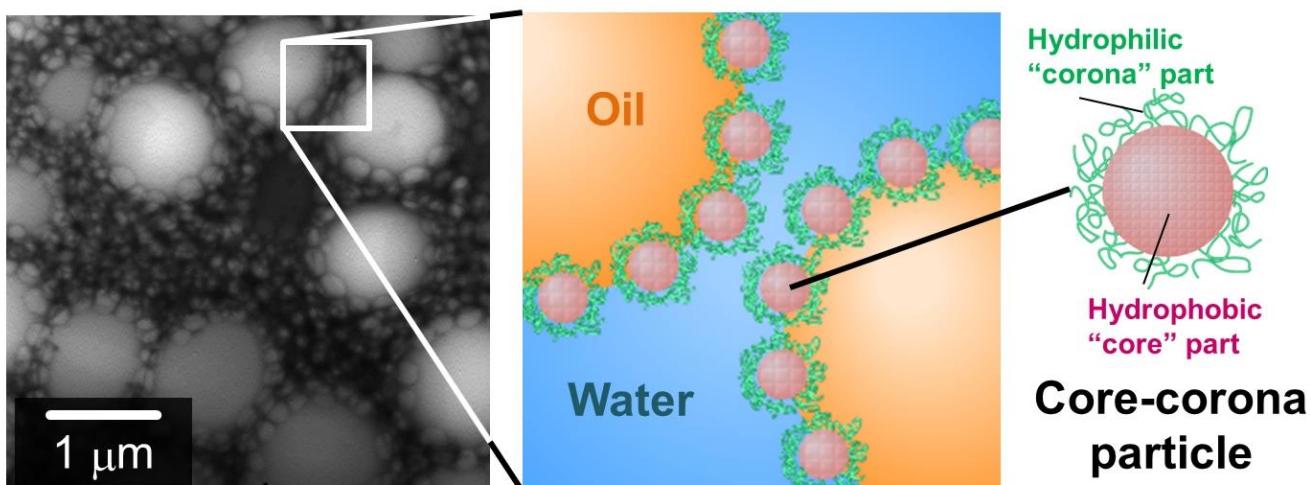


Figure. Electron micrograph of a core-corona particle emulsion (left) and enlarged schematic illustration (right)

Background of the development

All cosmetic products, including lotion, emulsion and cream, are required to meet consumers' expectations of smooth application, high quality and safety, alongside with maintaining skin and hair in a healthy condition. Emulsification plays an essential role in the development of such products. Emulsification is a technology that allows mixing of two immiscible liquids such as oil and water by forming granular droplets in one liquid and dispersing them in the other, i.e. dispersion medium. An ingredient called "emulsifier" is added to help stabilize the emulsion.

The most versatile emulsifiers are surfactants, which share the characteristics of both oil and water. Surfactants vary in types and help easily emulsify oil and water, thus they play a crucial role in cosmetics development. However, surfactants pose various restrictions on the development of products with both supreme texture and optimum functionality, because they result in unfavorable textures at high concentration,

or require changes in employment depending on the oil characteristics. Meanwhile, Pickering emulsion is stabilized with inorganic powders and acts as an alternative emulsifier to surfactants. However, this Pickering emulsion requires high concentration of particles, resulting in a powdery texture.

Development of core-corona particles with outstanding emulsification capabilities

In order to overcome the limitations of these two conventional emulsification methods that require surfactants or inorganic powders, Shiseido has developed a novel hydrophobic/hydrophilic polymer-particle emulsifier, “core-corona particle”. Core-corona particles, more than hundred-fold larger in diameter compared to conventional surfactants, consist of an inner “core” framework with hydrophobic properties and an outer “corona” possessing hydrophilic properties. Core-corona particles realize oil-in-water emulsification with the unprecedented freedom in choice of formulation, which far exceeds what conventional emulsifiers could offer.

Furthermore, core-corona particles create a supreme texture with less sticky or powdery feel as they are softer than inorganic powders used in Pickering emulsion and can emulsify oil and water at a far lower concentration. Stepping beyond the limits of conventional emulsification technologies, the core-corona emulsion technology, which offers versatility in cosmetics application, realizes innovative formulas such as “sunscreen with a dewy refreshing texture and high water resistance” and “highly effective moisturizing cream without a sticky feel”.



Advanced Research Center played the central part in the development:
Researcher, Ms. Sugiyama