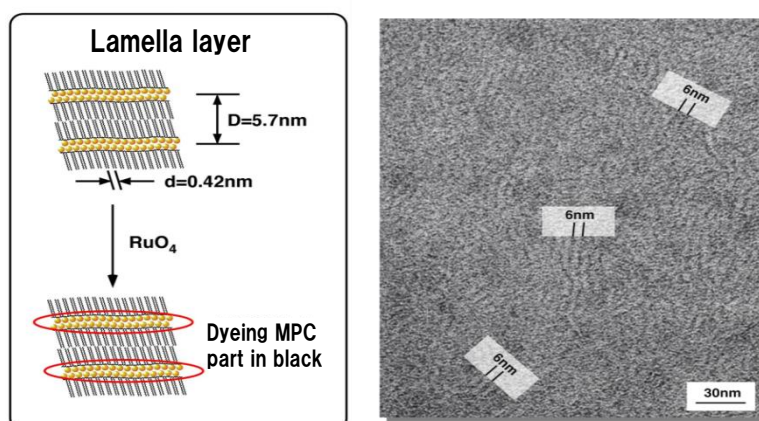


## 1 What is Lipidure<sup>®</sup>

Lipidure is the polymers which consist of 2-methacryloyloxyethylphosphorylcholine (MPC) which has the same structure as polar group of phospholipid, showing high hydrophilic nature and extremely high biocompatibility. Lipidure is widely used as a coating agent for artificial organ or eye care products due to high biocompatibility.

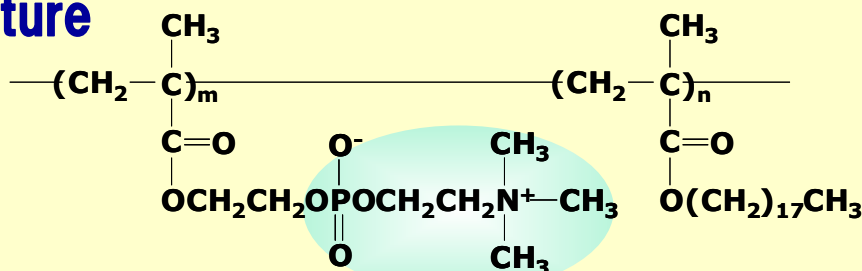
## 2 Properties of Lipidure<sup>®</sup>-NR

- ① Lipidure-NR forms a polymer nano-sphere in aqueous solution and forms a lamella layers on the skin surface after drying due to self associating property.
- ② Lipidure-NR can encapsulate hydrophobic active components such as vitamin E
- ③ Lipidure-NR shows excellent skin barrier and moisture retention effect by lamella layers on the skin surface.



## 3 Product overview of Lipidure<sup>®</sup>-NR

### Chemical Structure

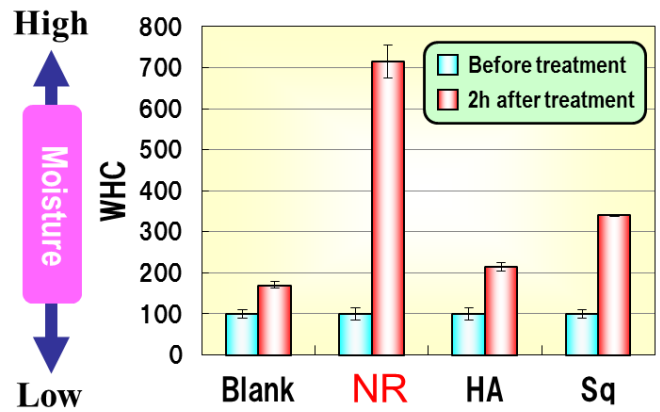
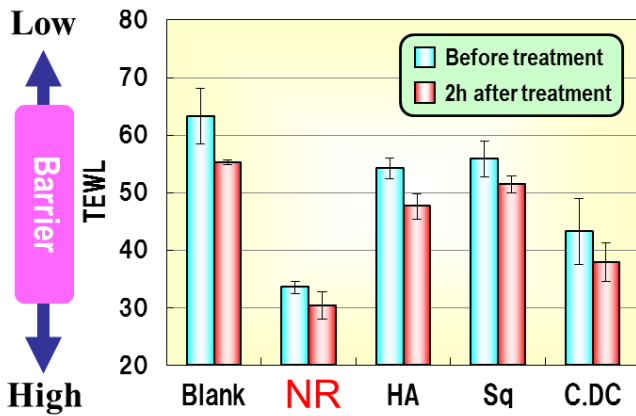


Lipidure<sup>®</sup>-NR is the only hydrophobic polymer of Lipidure series. It is diluted into a multivalent alcohol to make it possible to disperse into water.

Product Name	INCI Name	Chinese INCI	REACH status	Active conc.
Lipidure <sup>®</sup> -NR	POLYQUATERNIUM-61, GLYCERIN, BUTYLENE GLYCOL	Existing	Applying	5%

## [ Test Method ]

- (1) Measurement of TEWL and WHC at the inner upper arm of volunteers
- (2) Application of SDS solutions to the skin
- (3) Application of test solutions (10ul / 4cm<sup>2</sup>)
- (4) Measurement of TEWL and WHC after 2 hours from the treatment

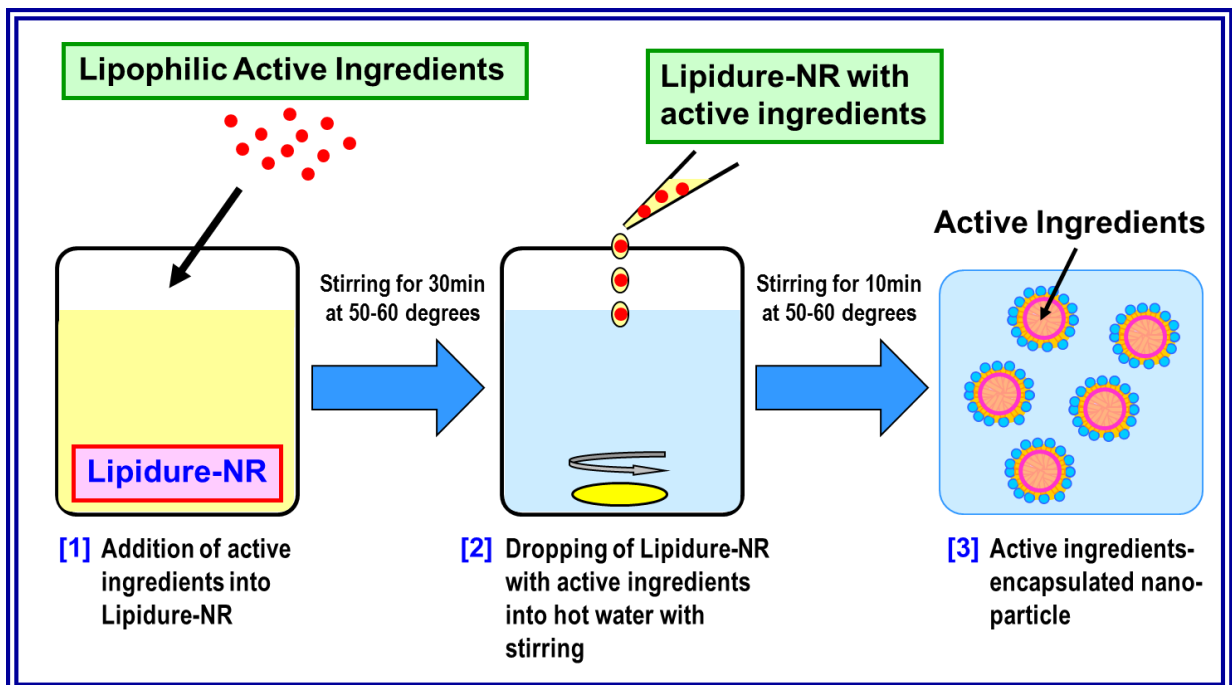


NR : Lipidure-NR in 5-fold aqueous dispersion  
 Blank : Bases (Glycerin/Butylene Glycol aq. sol.)  
 HA : Bases + Hyaluronic acid (0.25%)  
 Sq : Squalane (100%)  
 C.D.C : Cosmedia DC (100%)

NR : Lipidure-NR in 10-fold aqueous dispersion  
 Blank : Bases (Glycerin/Butylene Glycol aq. sol.)  
 HA : Bases + Hyaluronic acid (0.5%)  
 Sq : Squalane (100%)

**Lipidure-NR raise functions of the stratum corneum**

## Method of Inclusion of Active Ingredients



**Easily preparation of active ingredients included nano-particle**

# <Stabilization of Active Compounds>

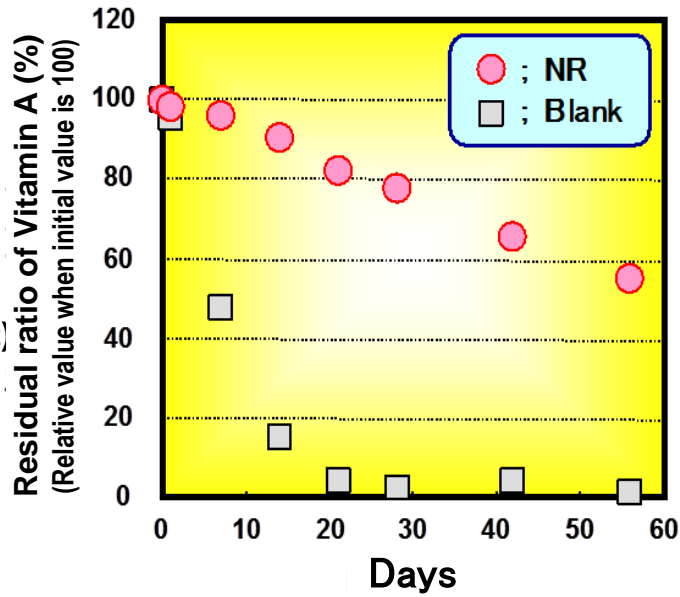
## Teted Samples

◆ **NR**  
 (Dispersion of Vitamin A-encapsulated nano-capsule)

[ Components ; **Vitamin A** : 0.05%  
**Lipidure-NR** : 10% (S :0.5%) ]

◆ **B**  
 (Solubilized solution of Vitamin A by surfactant)

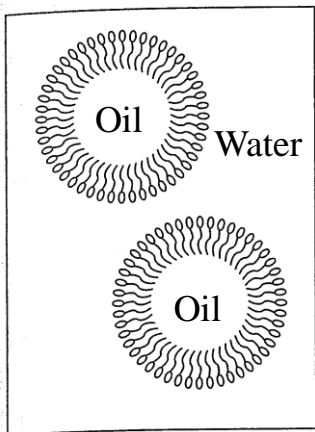
[ Components ; **Vitamin A** : 0.05%, **surfactant** : 5.0%]  
 ※Surfactant : Polysorbate 60



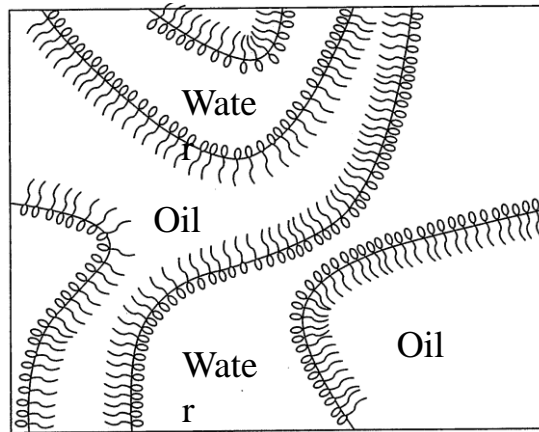
**Chemical stability of active compounds significantly is improved by encapsulation into nano-particle**

## 6 Increasing the amount of capsuled actives by BCME methods

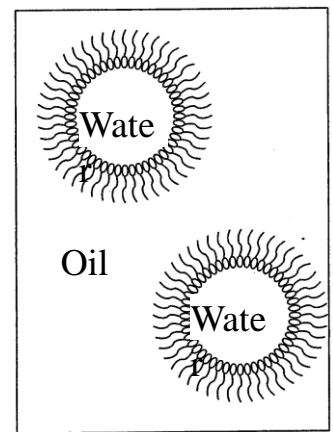
### The kind of micro-emulsion



O/W type



Bycontinuous type(BCME)



W/O type

### Feature

- Ultralow interfacial tension
- Ability to solubilize both aqueous and oil

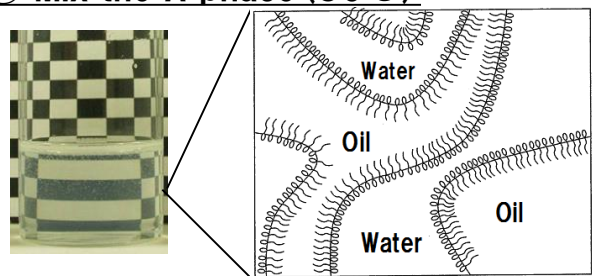
### Application

- Make-up remover
- **Nano-emulsion**

## BCME formulation

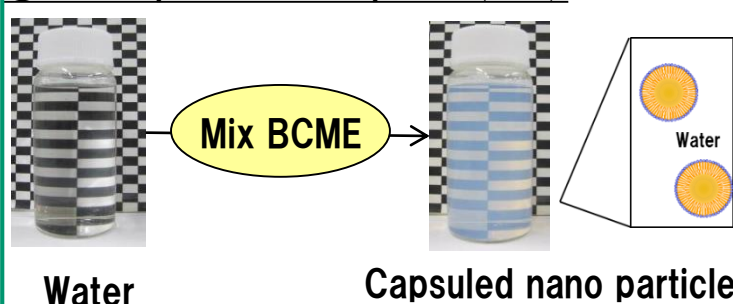
	Product Name	INCI Name	Contents (%)
A	SOLBULE® GS-01	PPG-13 DECYLTETRADECETH-24	0.5
	-	GLYCERIN	0.4
	Lipidure®-NR	POLYQUATERNIUM-61, GLYCERIN, BUTYLENE GLYCOL	2.0
	-	WATER	0.3
	-	OIL (See the table below)	Table below
B	-	WATER	Balance

### ① Mix the A phase (80°C)



Formation of BCME containing NR

### ② Mix A phase into B phase (R.T.)



## The kind of oil which can be capsuled

Product Name	INCI Name	Max capsuled amount (wt%)
RETINOL 15D	RETINOL, CAPRYLIC / CAPRIC TRIGLYCERIDE	0.5
-	TOCOPHERYL ACETATE	0.3
-	PHYTOSTERYL/OCTYLDODECYL LAUROYL GLUTAMATE	0.5*
-	LIMONENE	0.1
-	OCTYLDODECYL MYRISTATE	0.3
PARLEAM® EX	HYDROGENATED POLYISOBUTENE	0.3*

\*Add isostearic acid 0.1wt% as co-surfactants in the following formulation

**Various oils can be capsuled when combined with BCME technology**

Head Office



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