UV Capsules and Chemical UV filters

SUNJIN BEAUTY SCIENCE
AUG. 2020

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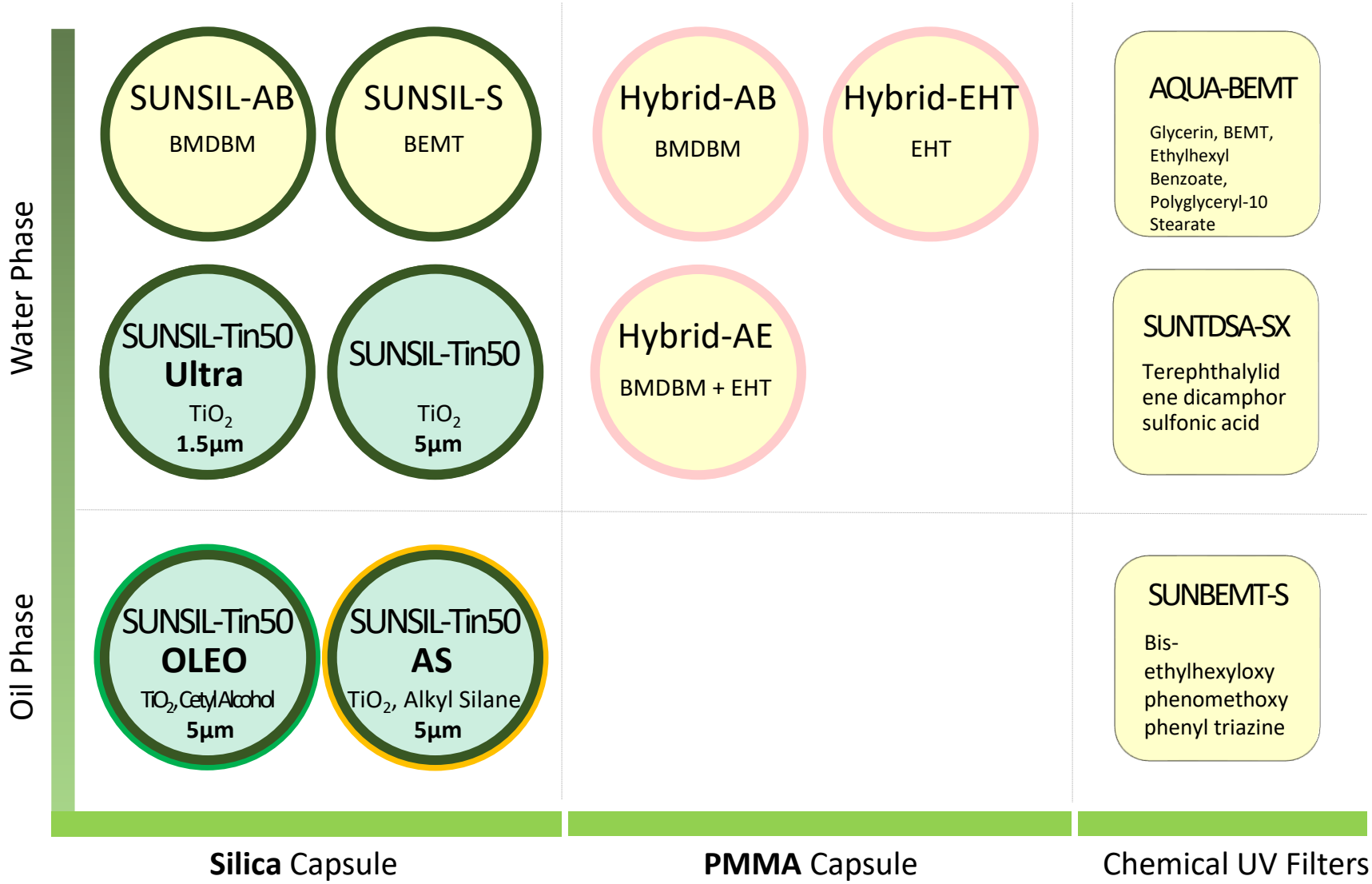
UV Capsules and chemical UV filters



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UV Capsules overview

	SUNSIL -Tin50 Ultra	SUNSIL -Tin50	SUNSIL -Tin50 OLEO	SUNSIL -Tin50 AS	SUNSIL -S	SUNSIL -AB	Hybrid -AB	Hybrid -AE	Hybrid -EHT
Shell	Silica	Silica	Silica	Silica	Silica	Silica	PMMA	PMMA	PMMA
Active %	TiO_2 45%	TiO_2 45%	TiO_2 45%	TiO_2 45%	BEMT 30%	BMDBM 30%	BMDBM 30%	BMDBM 30% EHT 15%	EHT 30%
Surface Treatment	-	-	Cetyl Alcohol	Triethoxy Caprylyl silane	-	-	-	-	-
Particle Size	1.5 µm	5 µm	5 µm	5 µm	7 µm	7 µm	5 µm	5 µm	5 µm
UV Protection	UVB	SPF Booster	SPF Booster	SPF Booster	UVA & UVB	UVA	UVA	UVA & UVB	UVB
Remarks	Non nano Most transparnet	COSMOS	COSMOS RSPO	-	-	-	-	-	-

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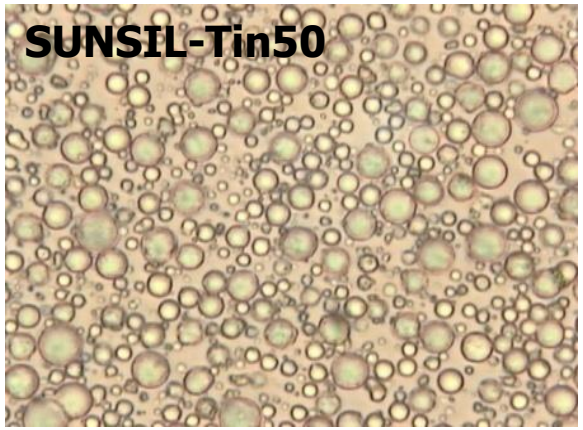
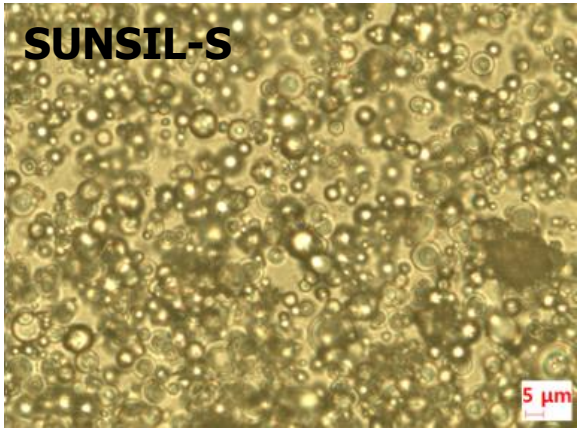
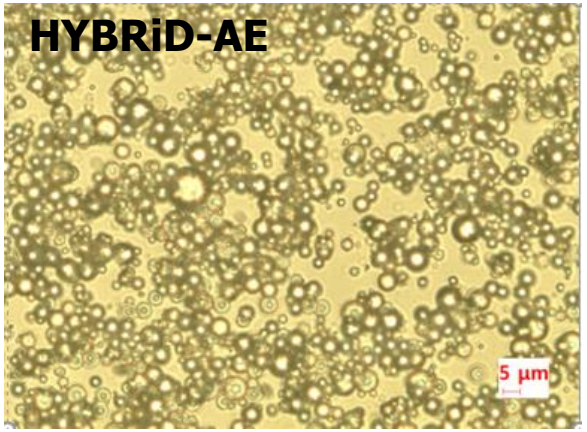
UV Capsules Overview

by Microscope







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UV Capsules Overview

by In-vitro

Tested UV Capsules

#1
SUNSIL-Tin50 Ultra
INCI : Silica & TiO2

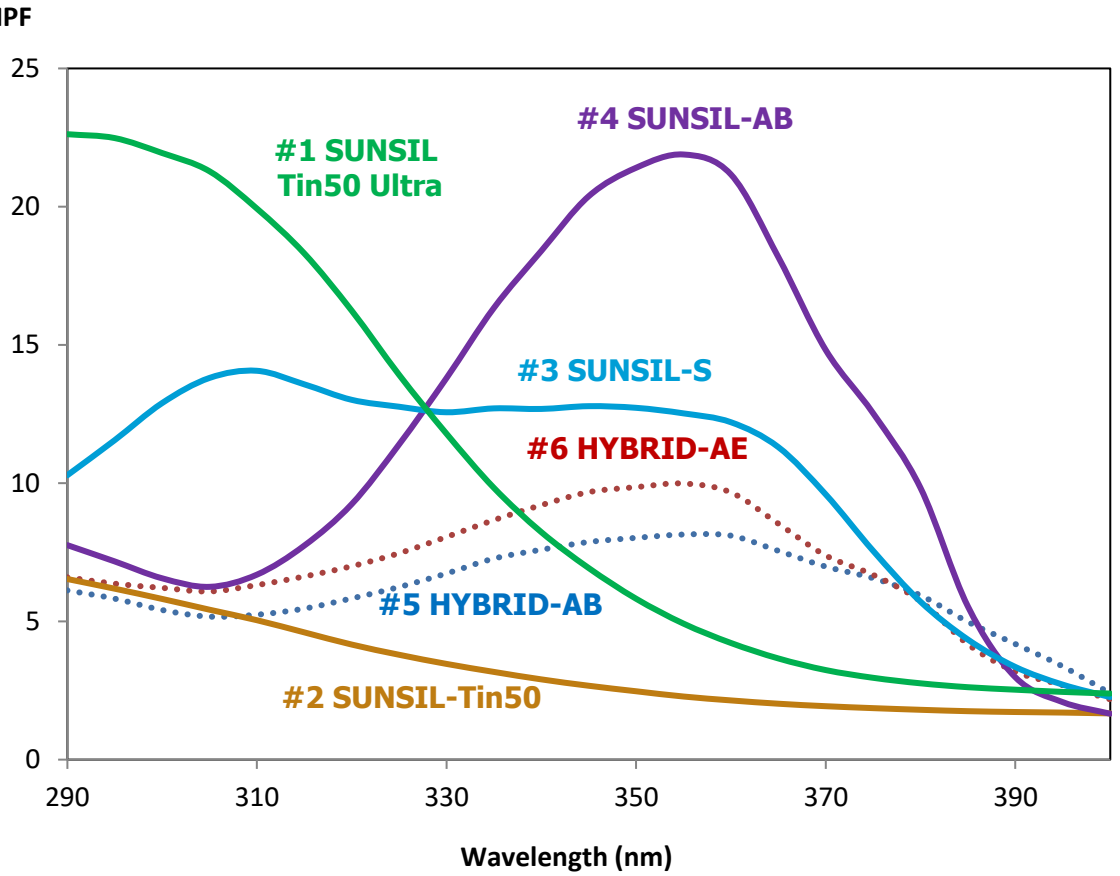
#2
SUNSIL-Tin50
INCI : Silica & TiO2

#3
SUNSIL-S
INCI : Silica & BEMT

#4
SUNSIL-AB
INCI : Silica & BMDBM

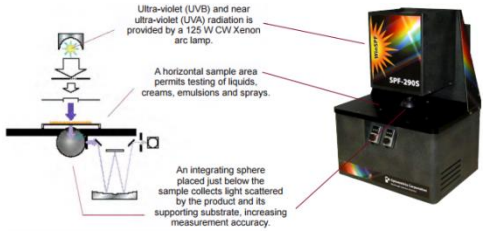
#5
HYBRID-AB
INCI : PMMA & BMDBM

#6
HYBRID-AE
INCI : PMMA & BMDBM & EHT



Tested fomula

Powder 10g + Vaseline 20g



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UV Capsules Overview

by In-vivo

SJF-2030 O/W EtOH, Micro Plastic, OMC Free Global SUNGEL SPF30 PA+++

Phase	Ingredients		INCI Name	%	Maker	#1	#2	#3	#4	#5	#6
A	D.I. Water		water	48.5							
	Pemulen TR-1		Acrylates/ C10-30 Alkyl Acrylate Crosspolymer	0.2	Lubrizol						
	Carbopol 940		Carbomer	0.05	Lubrizol						
B	Parsol HMS		Homosalate	10							
	Parsol EHS		Ethylhexyl Salicylate	5	DSM						
	Parsol 340		Octocrylene	4							
C	Tested UV capsules	SUNSIL-S	Silica & BEMT	7.5	SUNJIN	✓					
		SUNSIL-AB	Silica & BMDBM				✓				
		SUNSIL-Tin50 Ultra	TiO2 & Silica					✓			
		SUNSIL-Tin50	TiO2 & Silica						✓		
		HYBRID-AB	PMMA & BMDBM							✓	
		HYBRID-AE	PMMA & BMDBM & EHT								✓
	Greendiol		2,3-Butanediol	14	GS Caltex						
	TPG		Tripropylene Glycol	5	SKC						
	Glycerin		Glycerin	4.45							
D	TEA		Triethanolamine	0.2							
E	1,2-Hexanediol		1,2-Hexanediol	1							
	Sensiva SC 50		Ethylhexylglycerin	0.1	Schülke						

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UV Capsules Overview

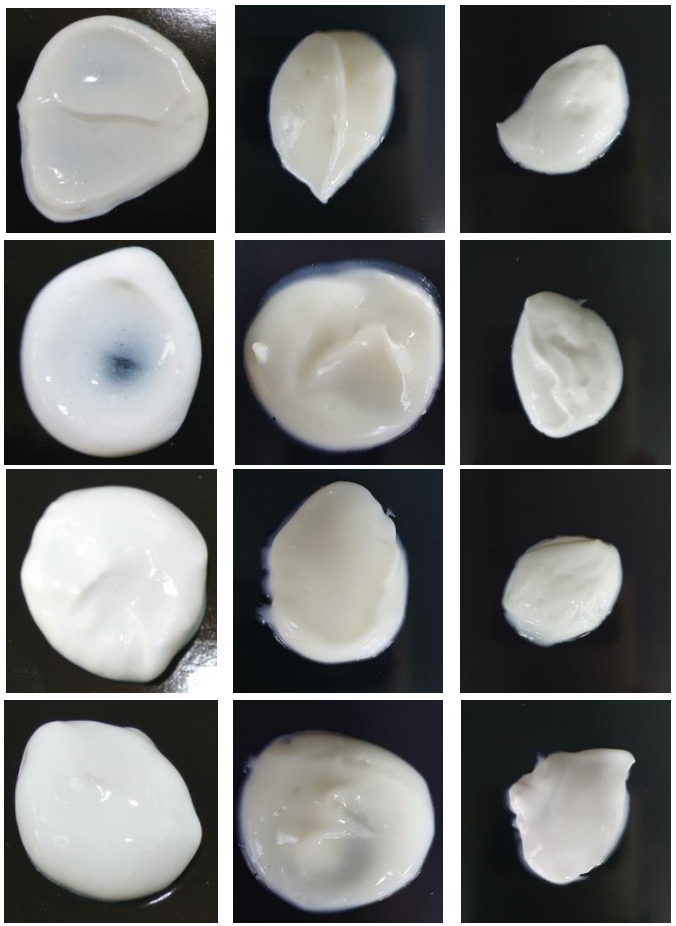
Thickener compatibility test

Tested materials

#1
Company: SUNJIN
Product: SUNSIL Tin50
TiO_2, Silica

#2
Company: SUNJIN
Product: SUNSIL-S
BEMT, Silica

#3
Company: SUNJIN
Product: HYBRID-AE
BEMT, Silica



Tested Thickeners

Bentone EW (1.0%)
Bentonite

Sepiplus 400 (1.0%)
Polyacrylamide/ C13-14 Isoparaffin/ Laureth-7

Aristoflex AVC (0.4%)
Ammonium Acryloyldimethyl taurate/VP Copolymer

Carbopol 940 (0.2%)
Carbomer

Test condition
Powder 10% ,
Different Thickeners solution 90%

Good compatibility

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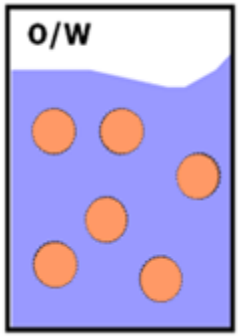
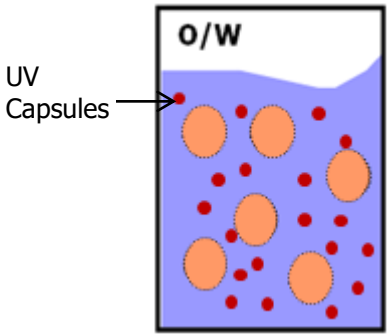
Why UV Capsules?



Most UV filters are either oils or need to be dissolved in polar emollients.
The results are highly loaded oil phases, which lead to the most common limitations in Sun Care formulations

- Reduced cosmetic elegance
- Lower flexibility to modify the sensory properties of formulations
- Suboptimal performance due to the use of filters mainly in one formulation phase



UV Capsules, water dispersible, can be incorporated in the water phase
The use of UV Capsules allow a balanced incorporation of UV filters in the water and oil phase. Therefore, a more homogeneous distribution of the UV filters on skin can be achieved which often result in a boosting effect

Through incorporation into water phase, UV Capsules offer increased formulation flexibility. Lower UV filter concentration is needed in the oil phase to achieve highest contribution to SPF and UVA-PF

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When & How to incorporate UV Capsules?

Melting point
BMDBM: 81~86℃
BEMT: 80 ℃
EHT: 123 ℃

Q: When?

A: After emulsion, after cooling down emulsion, incorporate UV capsules at low temperature(i.e. <30℃)

Q: Why?

A: As the Melting point of BMDBM is 81~86℃, if Hybrid AB adds before emulsion, during the emulsion process, the emulsion temperature could go up more than 81℃, BMDBM becomes liquid and it would be leaked out from PMMA shell.

Q: How to add?

A: Polymer Micro Beads are slightly hydrophobic, it would be difficult to incorporate polymer beads directly into water especially without poly alcohols Thus, premix polymer beads in poly alcohol solutions such as 1,3 Butylene Glycol or Propylene Glycol or Glycerin and add the premixed phase after emulsion

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Physical UV Filter **Silica Capsule**
SUNSIL-Tin50 series

SUNSIL-Tin50 Ultra

Composition
TiO_2 45%
Silica 55%

Particle Size
1.5 μm

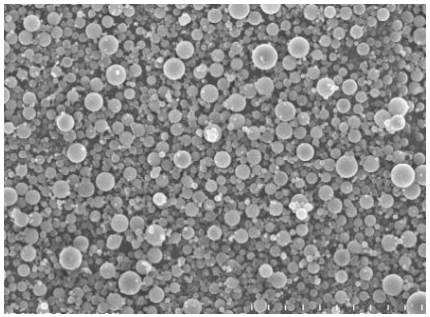
UVB Protection

SUNSIL-Tin50

Composition
TiO_2 45%
Silica 55%

Particle Size
5 μm

SPF Booster



SUNSIL-Tin50 OLEO

Composition
TiO_2 41%
Silica 51%
Cetyl Alcohol 8%

Particle Size
5 μm

SPF Booster

SUNSIL-Tin50 AS

Composition
TiO_2 41%
Silica 51%
AS 8%

Particle Size
5 μm

SPF Booster

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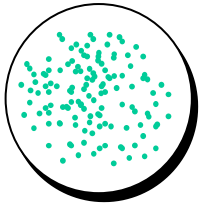
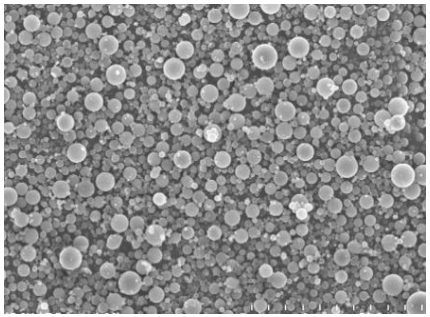
Physical UV Filter **Silica Capsule**
SUNSIL-Tin50 series

Silica Bead
With TiO_2



TiO_2 45%
Silica 55%



Benefits

1. Non Nano & COSMOS
2. Ultra Light Texture
3. Ultimate Transparency
4. Good SPF Boosting
5. Lessen the Glossiness
6. Thickener compatibility

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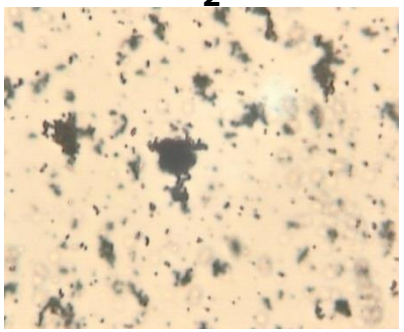
Ultimate Transparency

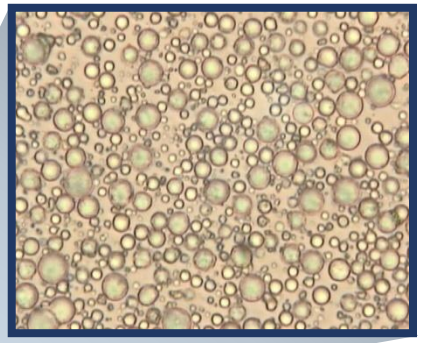
Nano TiO_2 looks dark under microscope as light beneath blocked by opaque TiO_2

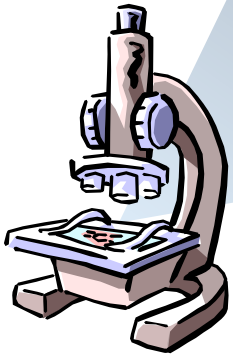
NANO TiO_2



Transparency

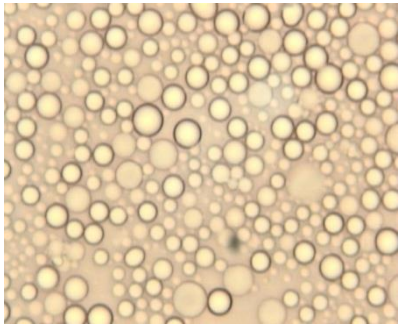
SUNSIL Tin50





SUNSIL Tin50 is almost as Transparent as Silica Bead

Silica Bead: SUNSIL 130



Silica Bead looks Transparent.

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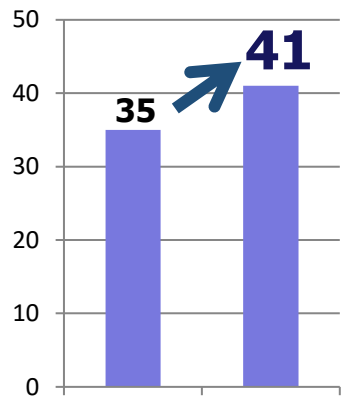
Good SPF Boosting Effect

The real beauty of Tin50 is that it boosts SPF of your formula while not hurting Light Feel and Transparency.

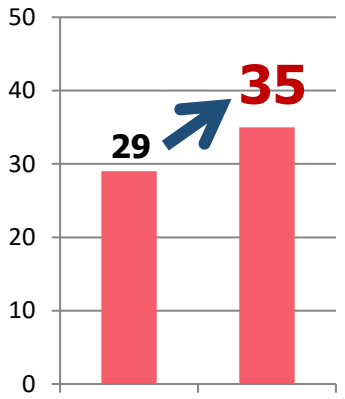
O/W Sun Cream



Nano TiO_2	2.3%	2.3%
Nano ZnO	12%	12%
OMC	3%	3%
OS	-	-
Tin50	-	3%

3% of Tin50 increased SPF from 35 to 41

W/O Sun Cream



Nano TiO_2	2%	2%
Nano ZnO	3.5%	3.5%
OMC	7%	7%
OS	5	5
Tin50	-	3%

3% of Tin50 increased SPF from 29 to 35

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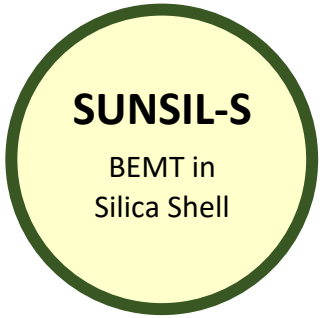
Chemical UV Filter **SILICA Capsule Water Dispersible**



SUNSIL-S

Composition

Silica	70%
BEMT*	30%

Particle Size
7 μm

UVA Protection
UVB Protection

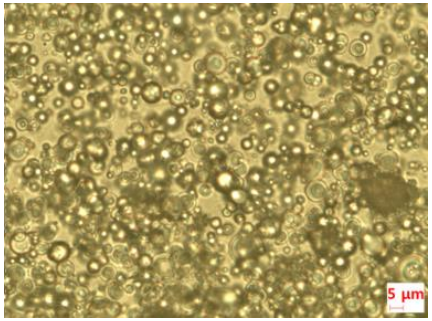
SUNSIL-AB

Composition

Silica	70%
Avobenzone**	30%

Particle Size
7 μm

UVA Protection



*BEMT: Bis-ethylhexyloxyphenol Methoxyphenyl Triazine
** Avobenzone: Butyl Methoxy Dibenzoylmethane(BMDBM)

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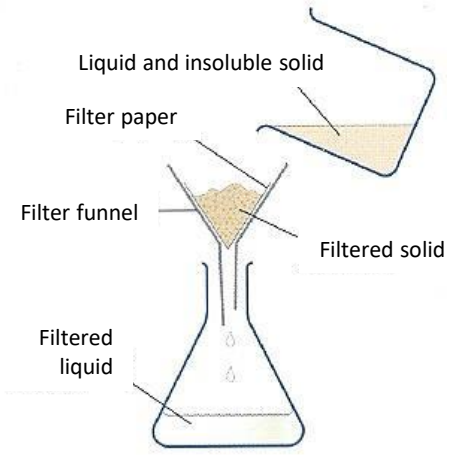
SUNSIL-S leakage test

Method

- Powder 10g + Polyol 10g add water to 100g
- Mixed under 1000 rpm for 5 min



- Filtered for 3 times with paper filter

- HPLC analysis

* High-pressure liquid chromatography (HPLC)

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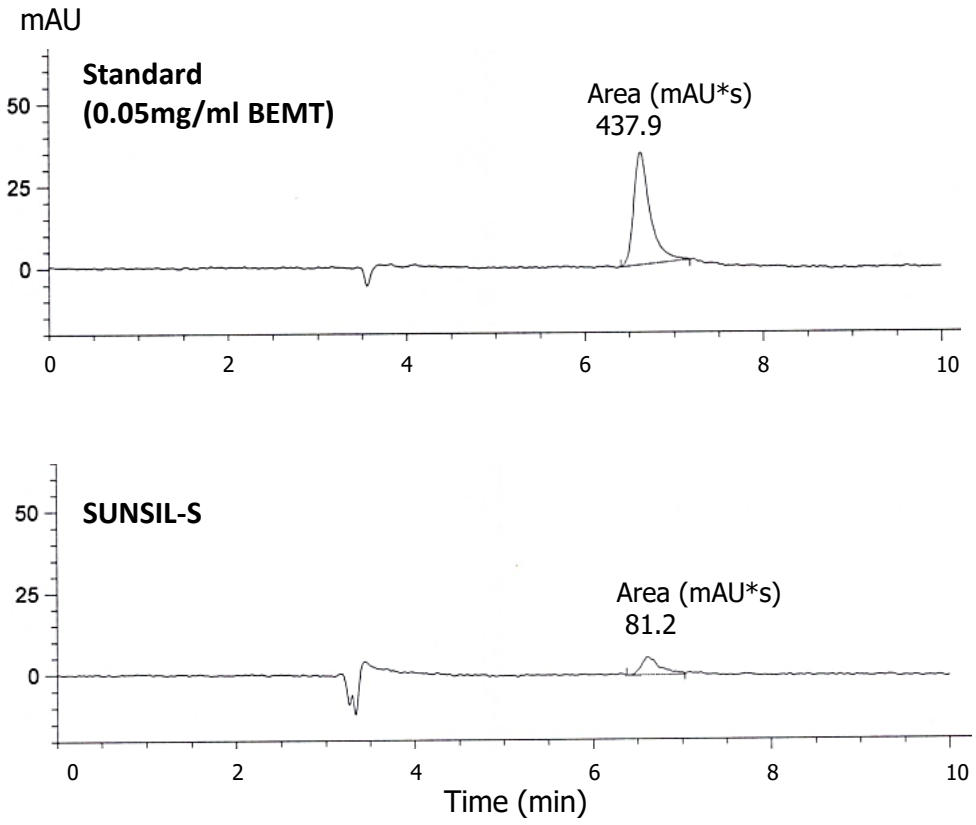
SUNSIL-S leakage test

Results



- The concentration of BEMT is very low in the tested condition
- The BEMT is difficult to leakage out of SUNSIL-S

WaveBCM 분석센터
910, NewTCastle, 108, Gasan digital 2-ro, Geumchoen-gu, Seoul, Republic of Korea
E-mail : shchop@hanmail.net
TEL : +82-2-924-6198/FAX : +82-2-924-619

선진시료 2종 중의 BEMT
(Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine)
함량 분석 결과 보고서

분석 일자	2020년 07월 13일 ~ 14일	분석방법	HPLC
시험물질명	선진시료		
Lot No.	-		
지표성분명	Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (BEMT)		
시료제조방법	- 시료 0.5ml 을 1.5 ml Eppendorf tube 에 각각 넣는다. - D.M.F를 가하여 1ml 채운 후 1시간 Sonication - Centrifuge (3500 rpm, 10 min) & Syringe filter(0.45 um) - Analysis		
분석조건	1. 장비 모델	Agilent 1200 HPLC	
	2. Column	ZORBAX Eclipse XDB-C_{18} 150 x 4.6 mm I. D., 5um	
	3. Guard column	ZORBAX Eclipse XDB-C_{18} 12.5 x 4.6 mm I. D., 5um	
	4. Mobile phase	Acetonitrile = 100	
	5. Detector	UV 342 nm	
	6. Column oven Temp.	60 ℃	
	7. Flow rate	0.5 ml/min	
	8. Injection volume	1 ul	

결과

1. BEMT 함량(%)

Sample (Lot No.)	함량 (%)	함량 (ppm)
선진 시료 1	0.00036	3.621

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Chemical UV Filter **PMMA Capsule Water Dispersible**

Hybrid-AB

BMDBM in PMMA Shell

Hybrid-AB

Composition

PMMA	65%
Avobenzone*	30%

Particle Size

5 µm

UVA Protection

Hybrid-AE

Composition

PMMA	55%
Avobenzone*	30%
EHT***	15%

Particle Size

5 µm

UVA Protection
UVB Protection

Hybrid-EHT

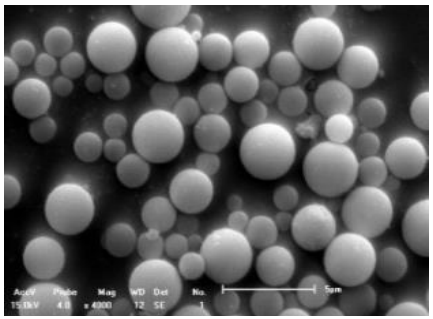
Composition

PMMA	65%
EHT**	30%

Particle Size

5 µm

UVB Protection



*Avobenzone: Butyl Methoxy dibenzoylmethane(BMDBM)
**EHT: Ethyl Hexyl Triazone

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