

기능성 캡슐가공 기술동향



ECO융합섬유연구원

출 처 : (주)폴리크롬 박종윤

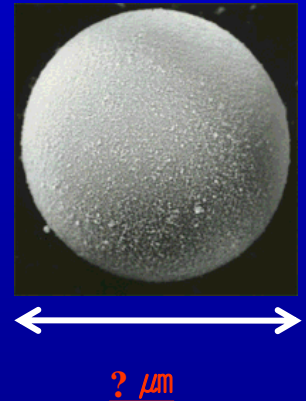
Content

- *What is Microcapsule ?*
- *AromaBall*® : **Perfume Microcapsule**
- *Chameleon T*® : **Thermochromic Microcapsule**
- *Polyshine (UVC)*® : **Photochromic dyes, and Microcapsule**

Microcapsules

- *What is Microcapsule ?*
- *Polychrom's Microcapsule*
- *Specification of Microcapsule*
- *Bioherb[®] Function and mechanism.*
- *Silver master[®]*

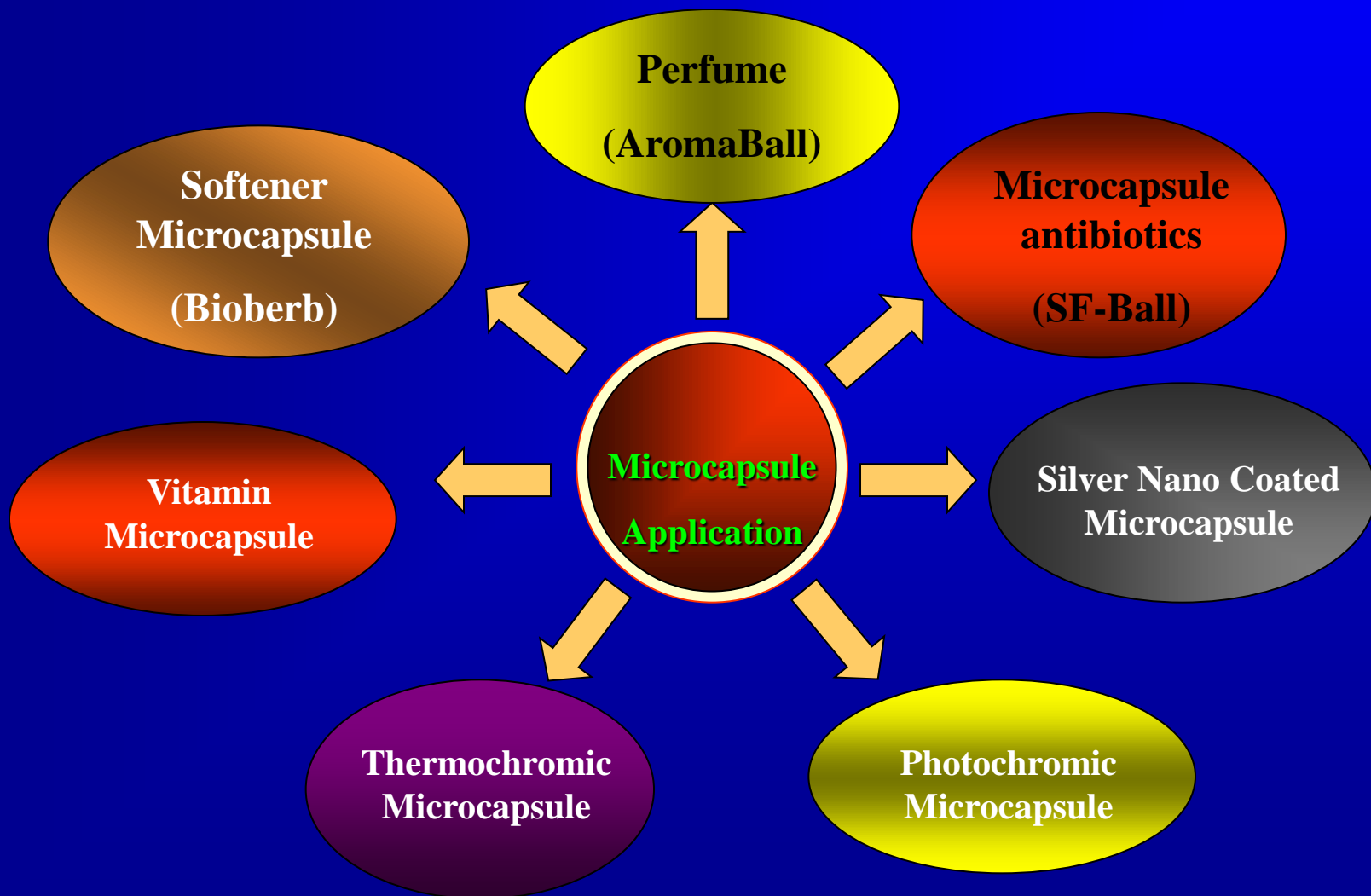
Encapsulations Research



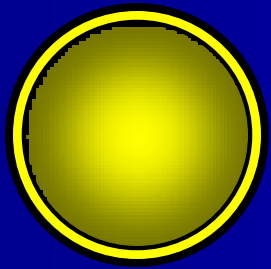
Functions of Microcapsules

1. Liquid to Solid
2. Change of Weight or Volume
3. Decrease of Volatility (휘발성)
4. Controlled Release (Shell)
5. Separation of Reactive Components (반응안정성)
6. Finely Divided Form (작은단위)

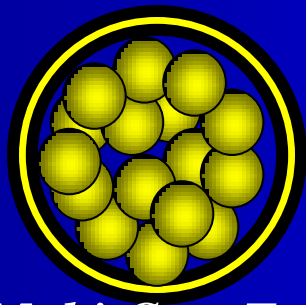
• Application Parts



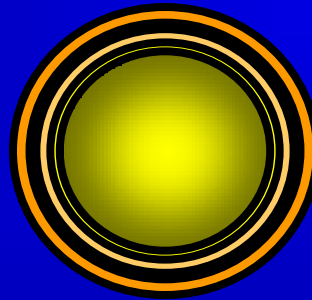
Various structures of Microcapsules



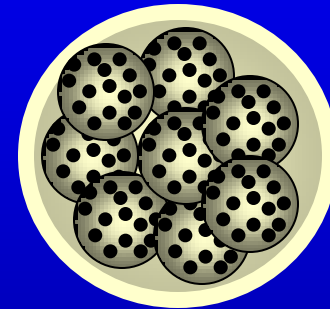
Simple Type



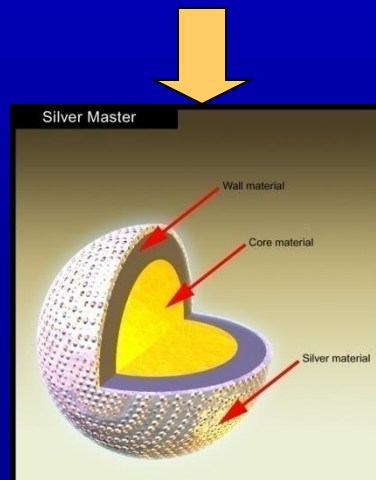
*Multi-Core Type
or
Multi Nucleus Type*



Multi-Wall



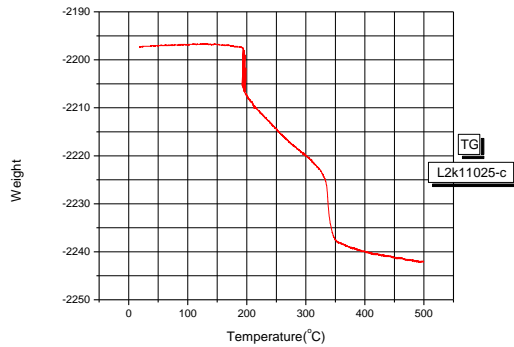
Cluster M/C Type



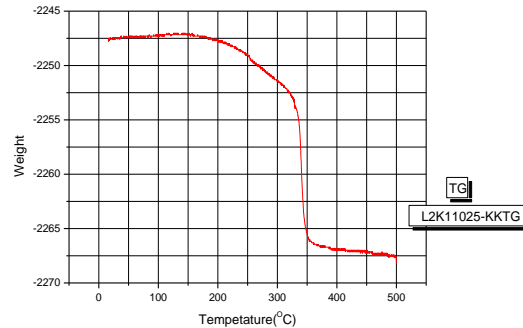
Polychrom's Microcapsule.

Various types of Micro-capsules

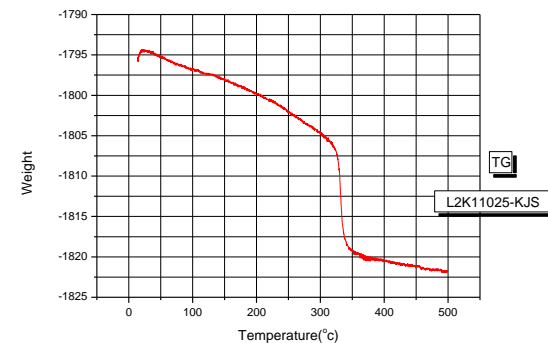
TGA DATA



General type



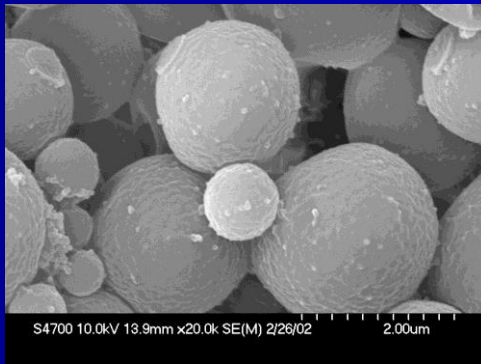
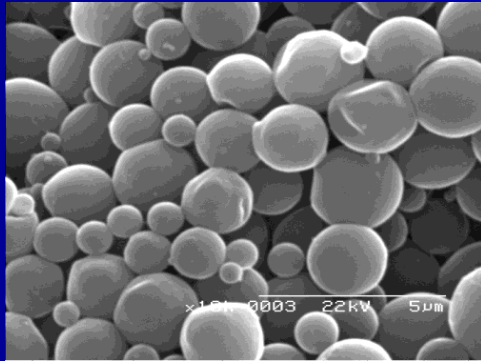
Heat Resistance type



Slow release type(Controlled Capsule).

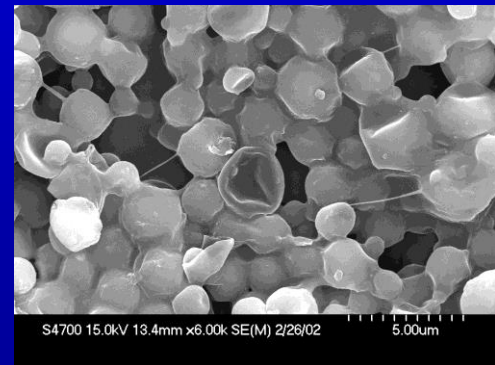
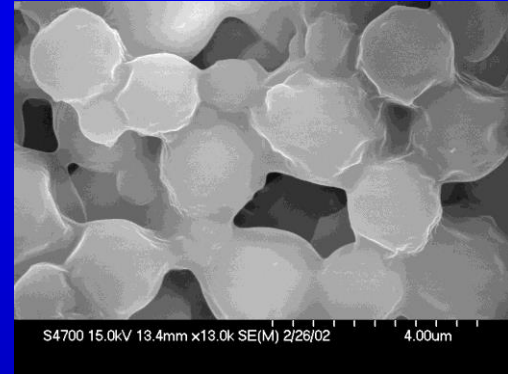
Comparison SEM

Made by Polychrom



Good

Other company



Bad

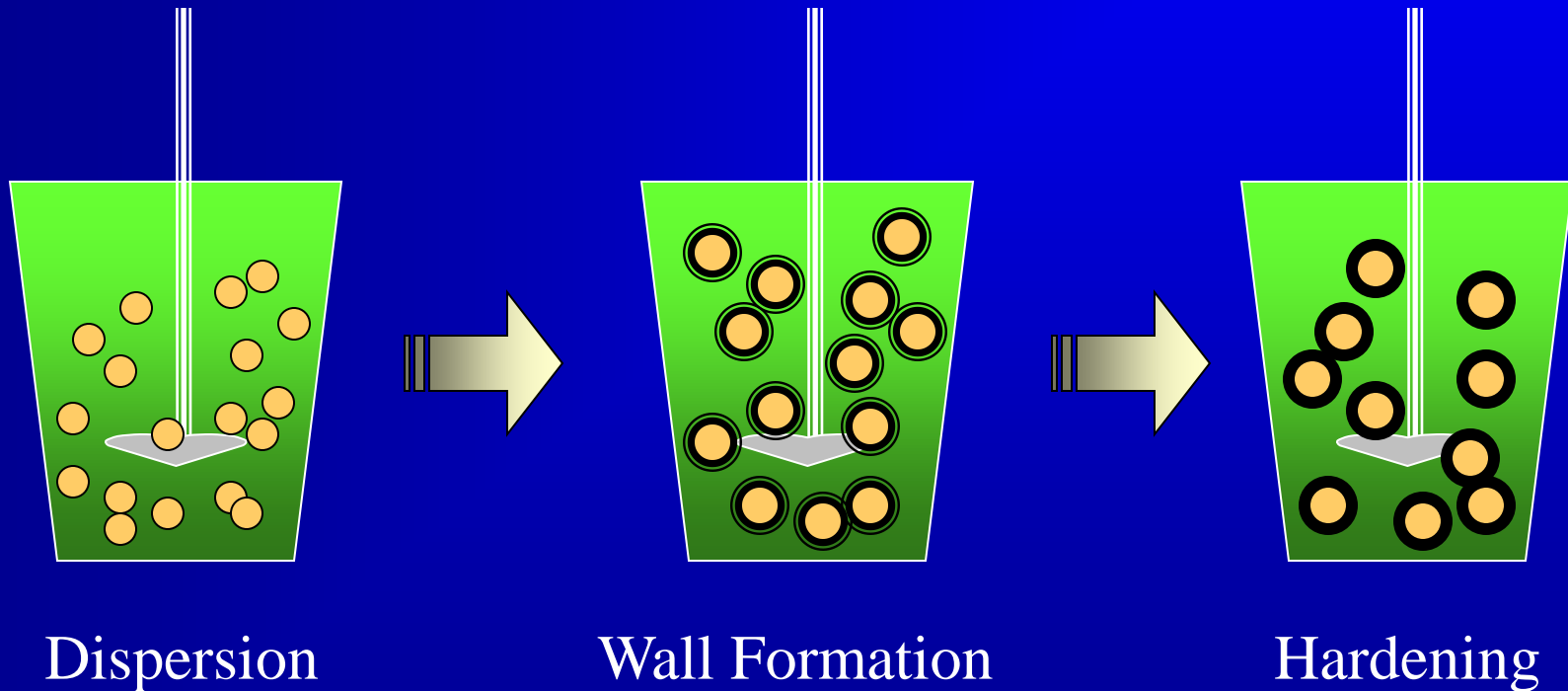
Checking method of perfume quantity and quality

- Appearance : microscope, SEM, sense test
- Color : sense test
- Odor : sense test
- pH : pH meter
- Solid content : dry oven (105 °C 2hr).
- Particle distribution : Particle analyzer.
- Storage stability
- Mesh test : **mesh diameter - 30mm, 15g capsule liq./1500g Water**
- Spectroscope
- SEM picture

Processing chart of Polychrom

M/C (MicroCapsule) Process

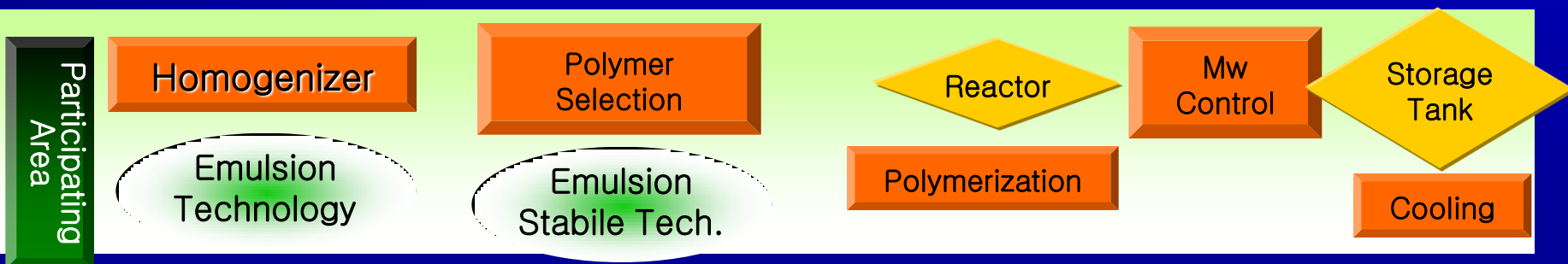
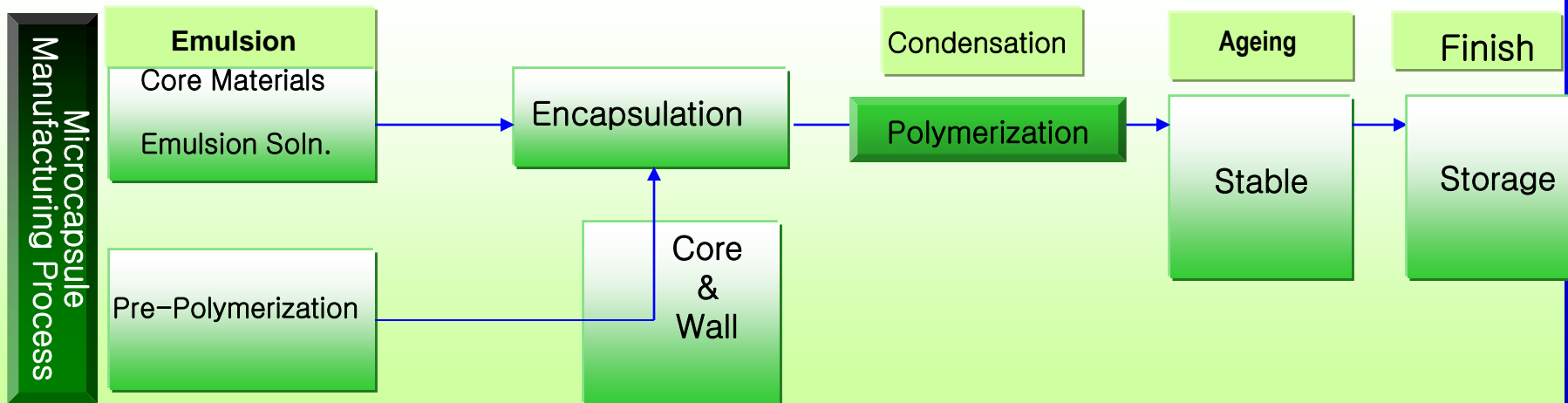
General scheme of Microcapsulation



In-situ method

■ Current Products

Participating Area of Polychrom in the Microcapsule manufacturing process



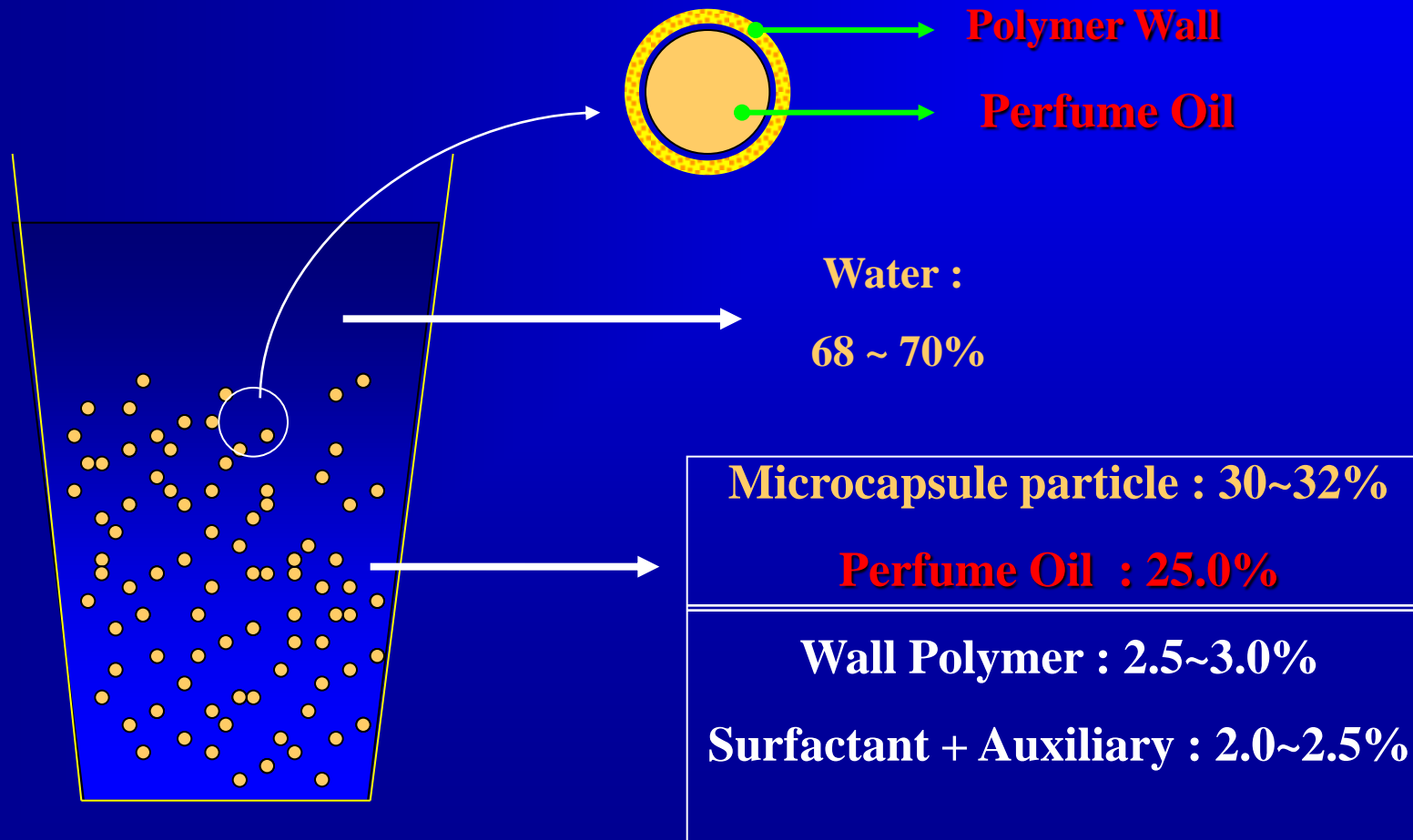
Aromaball[®]

Perfume Microcapsule

Compatibility with Organic Surfactants and System Components.

- Aromaball[®] (perfume microcapsule) is easily blended with most **anionic surfactants** and **non-ionic surfactant**.
- But, Aromaball[®] is trouble with *Cationic surfactant* because Aromaball[®] is in anionic liquid condition.
- Careful use Aromaball[®] with Cationic surfactant.

Components ratio in Microcapsule slurry



Application product by **L Company**

**Microcapsule contained
Softener**

**L Campnay was using 0.3% of
Polychrom perfume microcapsule in
its product.**

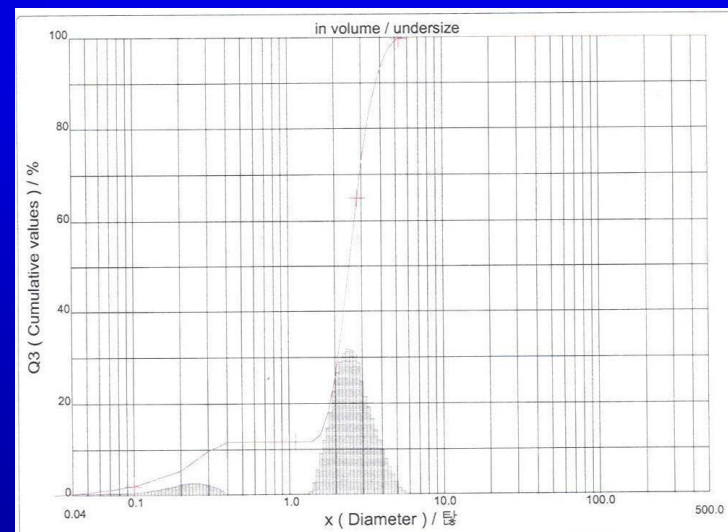
**An exclusive fiber softener with fragrance
that remains for a long time**



The fragrances are contained in **micro-capsules**,
which makes the perfume last longer, and after each wash bacteria and
odor are removed and clothes become more hygenic and smell great.

Specification of Polychrom's Microcapsule in L _ company

Appearance	Slight Yellow white liquid
Classification	Violet Flower Perfume Oil
pH	6.3
Viscosity(24 °C)	202± 5cps
Specific gravity	1.01
Non-Volatile Matter	30.2%
Mean Particle Size	2.56 μm
Mesh Test (mesh diameter : 30mm, 15g capsule liq./1500g Water)	11.0 sec
Capsule Wall Type	Melamine
Harmful Alcohol	Not Use
Flammable	None

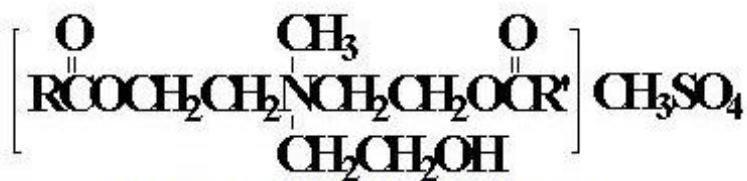


Particle size distribution

UNILEVER Project

- VIETNAM
- INDONESIA
- THAILAND
- Three Perfume
- Softener
- INDIA
- CHINA ETC.

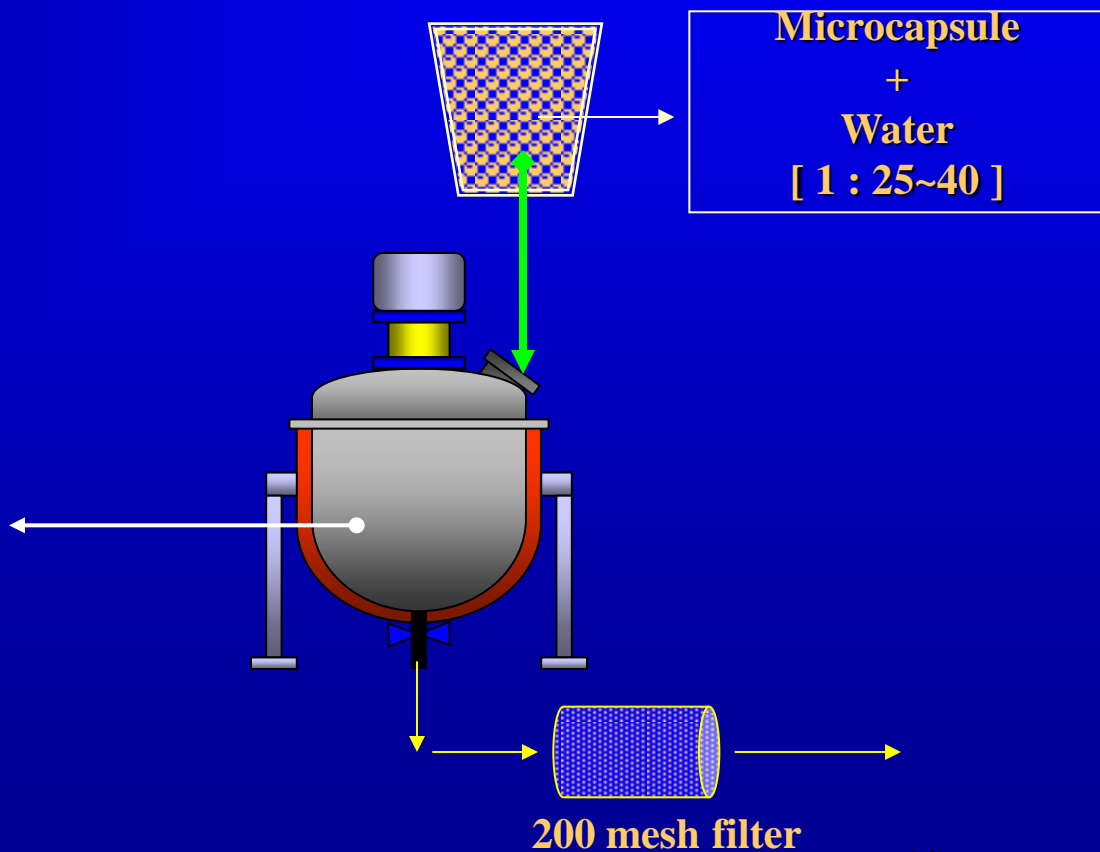
Mixing Process for Softener



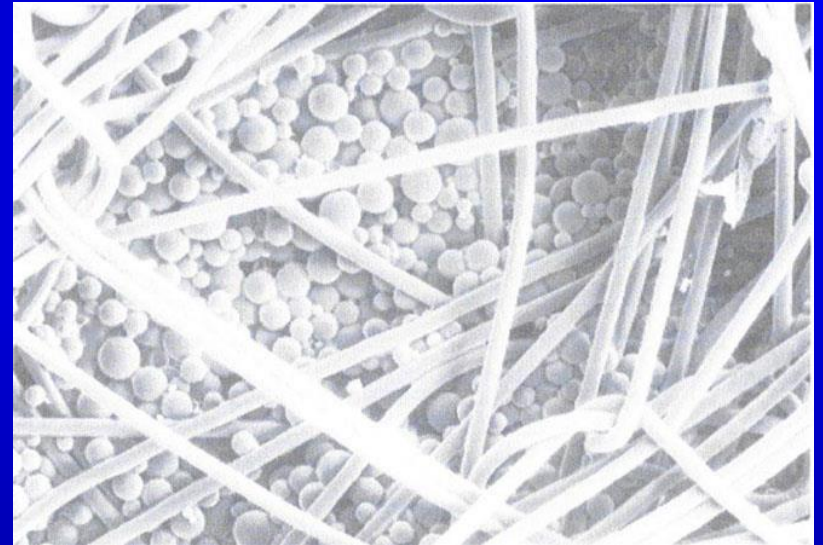
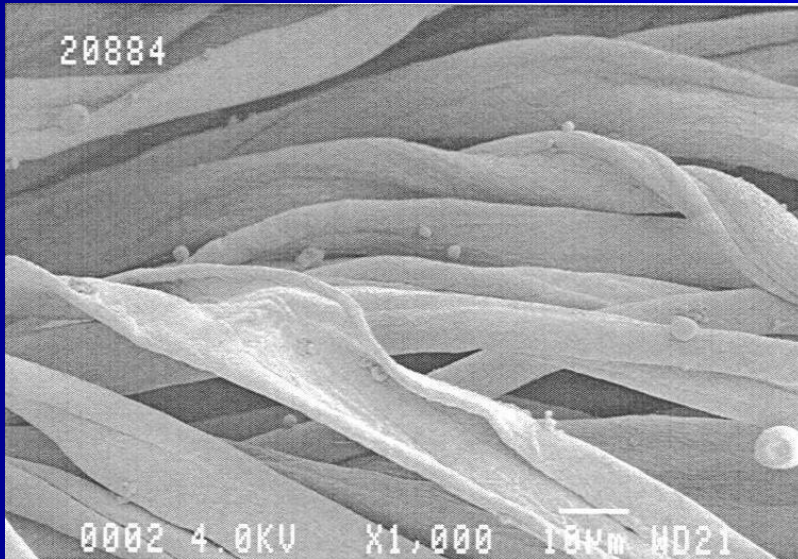
N,N-(Bisacyloxyethyl)-N-(2-hydroxyethyl)
-N-methyl ammonium methylsulfate

EQ

CAS No; 91995-81-2

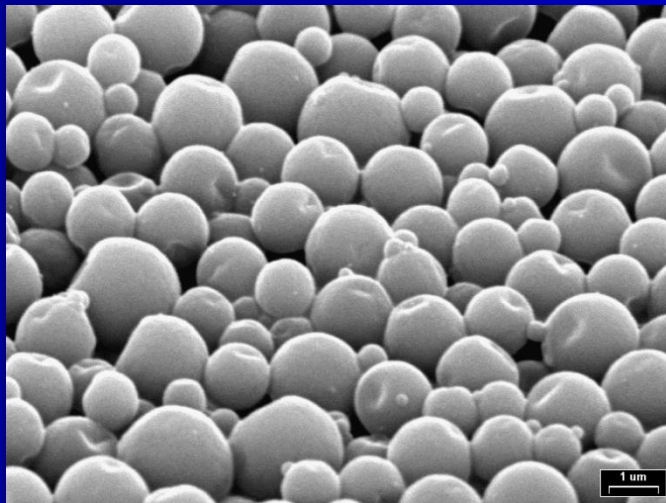


Microcapsules on fabric



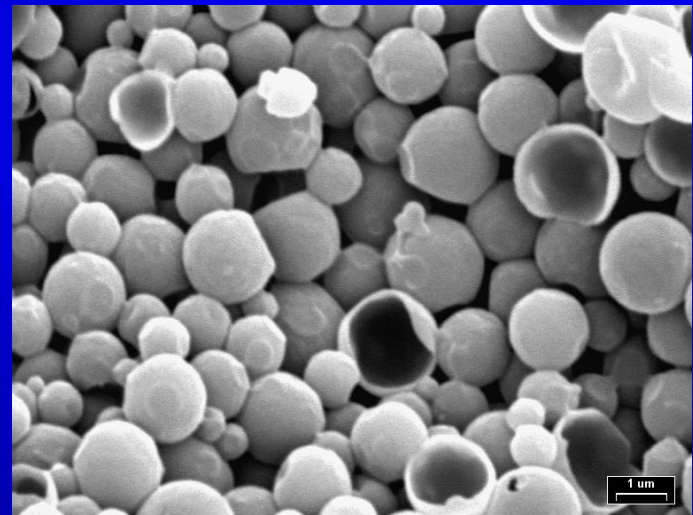
SEM

Perfume Microcapsule



Before

Rubbing

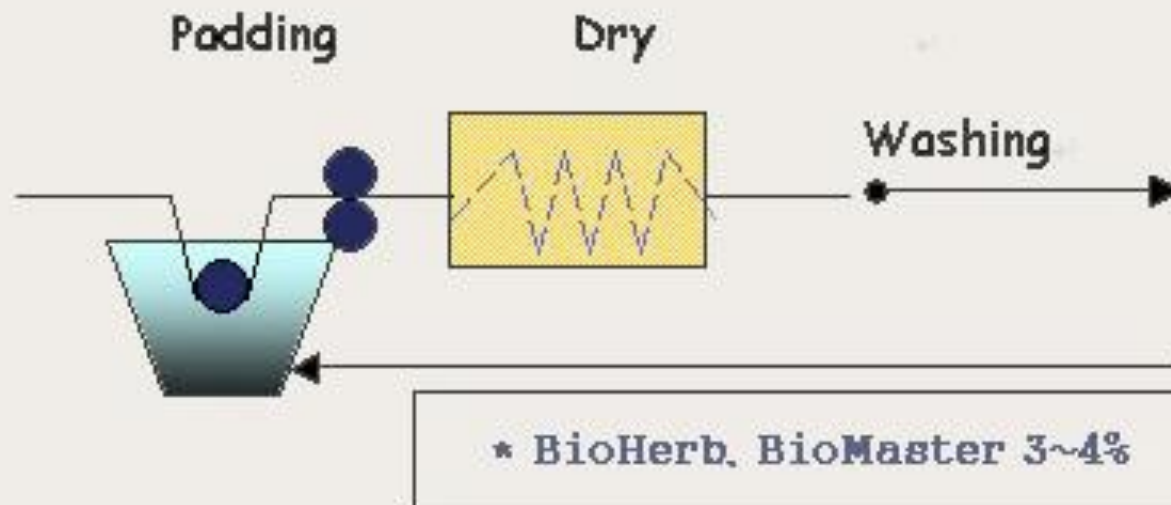


After

Application field : Textile, Coating, Plastic Injection, Paint, Binder...

Textile process

One Bath Pad-Dry Method



Formaldehyde content test

Oko-Tex standard 100

Formaldehyde content test:

	baby	Skin contact	decoration
Formaldehyde (ppm)	20	75	300

Korea Textile Inspection & Testing Institute
KIST YONGSAN-DOPO, KANGNAM-GU, SEOUL, KOREA 152-82
TEL : (02) 567-7911 FAX : (02) 567-4738

TEST REPORT

KOTITI REPORT NO. : A-18364 July 16, 2001

APPLICANT : POLYCHROM

Sample Description : One (1) knitted fabric, submitted on July 10, 2001***

Item	: AROMABALL S-PEACH/A 0.1% WASHING
Buyer	: N/S
Style Number	: N/S
P.O. Number	: N/S
Color(s) Submitted	: N/S
Submitted Fiber Composition	: N/S
Submitted Care Instructions	: N/S

TEST CONDUCTED	TEST RESULT(S)	TEST METHOD
Formaldehyde Content (Acetyl-Aceton Method B), ppm	7	KS K 0611
< Incubation condition : 40°C for 1 hour >		

Sample
KOTITI-KOTITI-KOTITI

KOTITI KOTITI KOTITI

Kyu Huh
KYU HUH
DIRECTOR GENERAL

Please be advised that the official seal of KOTITI and the original sample(s) will not be affixed to the test report if you receive it by internet fax.
OUR REPORTS AND LETTERS ARE FOR THE EXCLUSIVE USE OF THE CLIENT TO WHOM THEY ARE ADDRESSED, AND THEIR CONTINUING VALIDITY IS ASSURED ONLY BY THE USE OF THE NAME OF KOREA TEXTILE INSPECTION & TESTING INSTITUTE. NO OTHER WRITING, APPROVAL, OR LETTER AND FORMS SHOULD BE USED TO THE TESTER'S NAME. ANY CHANGES AND TO THE SAMPLES TESTED. THE TEST RESULTS ARE NOT NECESSARILY INDICATIVE OR REPRESENTATIVE OF THE QUALITY OF THE LOT FROM WHICH THE SAMPLE WAS TAKEN OR APPROVED BY THE INSTITUTION. THE TESTER'S NAME, ADDRESS, AND PHONE NUMBER SHOULD BE PRINTED ON THE REPORT. THE REPORT SHALL BE THE PROPERTY OF KOTITI AND SHALL BE RETURNED TO KOTITI UPON REQUEST. THE REPORT SHALL BE THE PROPERTY OF KOTITI AND SHALL BE RETURNED TO KOTITI UPON REQUEST.

Peach Microcapsule Slurry 0.1% Washing : 7ppm

Test Method : KS K 0611

Microcapsule treated fabric

BioHerb®

BioHerb Functionality

Aroma, Antibacterial Activity, Insect Resistance



Repel ticks

FITI TESTING & RESEARCH INSTITUTE
Korea Textile Inspection & Testing Institute
Korea Government Designated Service Agency
Korea Accredited Organization of KOSHA, ISO 17025

TEST REPORT

APPLICANT : POLYCHROM REPORT NO : KH-103-04762
DATE : 2003-02-28

SAMPLE DESCRIPTION : ONE(1) PIECE OF KNIT FABRIC, SUBMITTED ON 2003-02-22
ITEM : BIOHERB ROSEMARY 2%

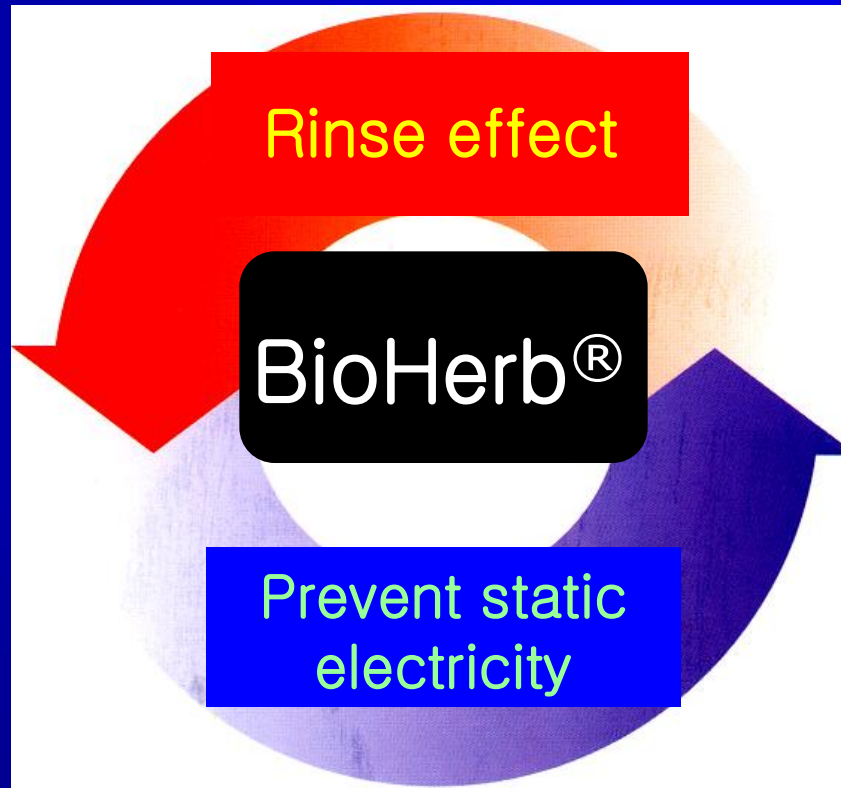
TEST CONDUCTED TEST RESULTS

1.1.1. ANTIBACTERIAL ACTIVITY TEST (ISO 15820-2003) OPU/4M, BIOSTATIC REDUCTION RATE %

BLANK	SAMPLE
<p>BACTERIA-1 : STAPH</p> <p>INITIAL NUMBER : 2.5×10^5</p> <p>STATISTIC REDUCTION RATE : 99.9%</p>	<p>BACTERIA-1 : STAPH</p> <p>INITIAL NUMBER : 1.3×10^5</p> <p>STATISTIC REDUCTION RATE : 99.9%</p>
<p>BACTERIA-2 : E. COLI</p> <p>INITIAL NUMBER : 2.5×10^5</p> <p>BIOSTATIC REDUCTION RATE : 99.9%</p>	<p>BACTERIA-2 : E. COLI</p> <p>INITIAL NUMBER : 1.3×10^5</p> <p>BIOSTATIC REDUCTION RATE : 99.9%</p>

NOTE : 1. SAMPLE WEIGHT : 0.4g
2. INocULATING RATE : BACTERIA-1 : 47 TIMES
BACTERIA-2 : 45 TIMES
3. INOCULUM CONCENTRATION : BACTERIA-1 : 1.5×10^5 CFU/g
BACTERIA-2 : 1.5×10^5 CFU/g
4. STANDARD PAPER/CLAMP : BACTERIA-1 : 20mm
BACTERIA-2 : 20mm
5. TEST BACTERIA : BACTERIA-1 : STAPHYLOCOCCUS AUREUS ATCC 25922
BACTERIA-2 : ESCHERICHIA COLI ATCC 8739

Antibacterial Activity :99.9%



Korea Textile Inspection & Testing Institute
Korea Textile Inspection & Testing Institute
Korea Government Designated Service Agency
Korea Accredited Organization of KOSHA, ISO 17025

TEST REPORT

KOTITI REPORT NO : A-5271 March 7, 2003

APPLICANT : POLYCHROM

Sample Description : One (1) knitted fabric, submitted on February 28, 2003***

Item : BIOHERB ROSEMARY (2%)

TEST CONDUCTED TEST RESULT TEST METHOD

Arroma Retain Property
*After 5 Washes The sample smells of arroma
**Washing condition : Machine wash warm, Gentle cycle, Dry Flat (KS K 5465-2001)

Sample
KOTITI KOTITI KOTITI
KOTITI KOTITI KOTITI 1

Kyu Huh
KYU HUH
DIRECTOR GENERAL

*Please be advised that the official seal of KOTITI and the original samples will not be affixed to the test report if you receive it by Internet.

Aroma after 5 washes

BioHerb®

BioHerb® is used at Home in case of Laundry and rinse process.

- **Perfume** effect (향기유지)
 - Rinse effect(유연기능)
 - **Vitamin E** effect(기능성)
 - **Antibacteria** effect(항균)
- **Insect resistance** effect (방충)

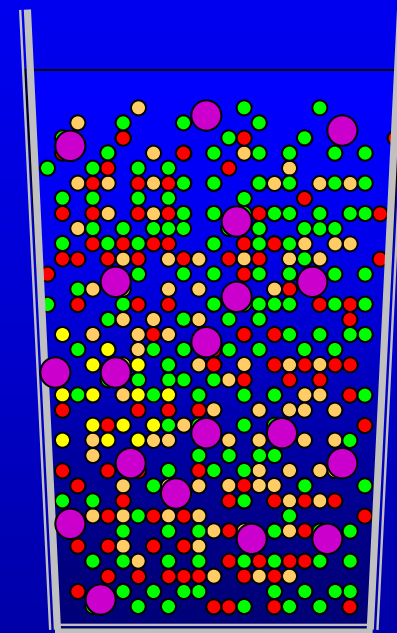
Contents of *BioHerb*®

1. Parts of Microcapsule

- 1) AromaBall (*Perfume* Microcapsule) ●
- 2) SF-Ball (*AntiBiotic* Microcapsule) ●
- 3) HunterBall (*Insect Resistance* Microcapsule) ●
- 4) BioBall (*Vitamin-E* Microcapsule) ●

2. Silicone Softener

3. Auxiliary : deformer, surfactant, dyes,
Thickener...



BioHerb®

Characteristics of Microcapsule in **BioHerb®**

	Aroma Ball	SF-Ball	Hunter Ball	BioBall Vitamin E Ac
Classification	Perfume M/C	Antibiotic M/C	Insect Resistance M/C	Vitamin M/C
M/C Wall Type	Melamine copolymer			
Functionality	Aromatheraphy	Antibiotics	Resistance of the ticks(mites)	Moisture in skin
Main ingredient	Aroma oil	Antibiotic agent	Natural material (extracts of chrysanthemum)	Vitamin E acetate

Example of washing process

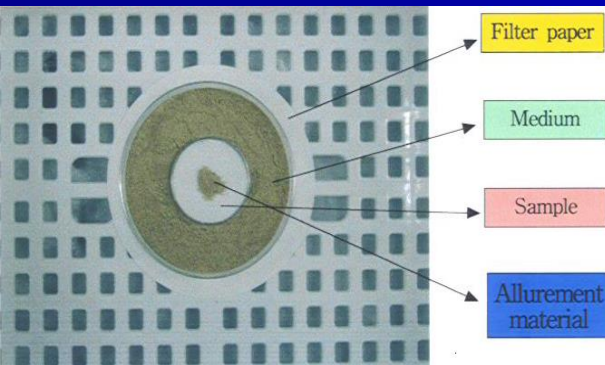



Difference with general fiber softener

Class	Other general softener	<u>BioHerb®</u>	Note
Use example	45~60 ml/Water 60 liter standard	45~50 ml/Water 60 liter standard	
effect	Usually function as softener	Fragrance by micro- capsule and antibacterial function beside softness effect	Use harmless high-quality softener for human body

Test report of HunterBall

Insects resistance test for ticks



 KOREA CONSUMING SCIENCE RESEARCH CENTER
892-64 Cheongdong, Tongdeamun-gu, Seoul, Korea, Tel : (02) 3299 - 8091-5, Fax:(02) 3299 - 8159

TEST REPORT

APPLICANT : Polychrom., Co. Ltd. REPORT NO. : 536302-01741
ADDRESS : # 652-2, CHOJI-DONG, ANSANN-CITY, ISSUED DATE : 2002. 07. 22.
KYUNGKI-DO, KOREA APPLIED DATE : 2002. 07. 02.

SAMPLE DESCRIPTION

"HunterBall - 3 %" (See attached sample)

CONCLUSION

According to result of test for avoidance and destruction of mite, we consider that the tested sample "HunterBall - 3 %" has an effect on avoidance of a mite for test insect "*Dermatophagoides farinae*" & "*Dermatophagoides pteronyssinus*"

INCLOSURE : A copy of test result.

Ho-chul Kim
EXECUTIVE DIRECTOR
FITI KOREA CONSUMING
SCIENCE RESEARCH CENTER

OUR REPORTS APPLY ONLY TO THE SAMPLE TESTED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS.

The test result of ticks shows a repelling ratio of more than 99.9% respectively in the spread-checking method, infiltration-checking method and test tube method.

: FITI (Korea Fabric Inspection & Testing Institute)

Specification of **BioHerb®**

pH	6.5 ~ 7.5
Viscosity	80 ~ 150 cps
Specific gravity	1.000 ± 0.03
Non-Volatile Matter	7.0-9.0 %
Harmful Alcohol	Not Used
Flammable	None

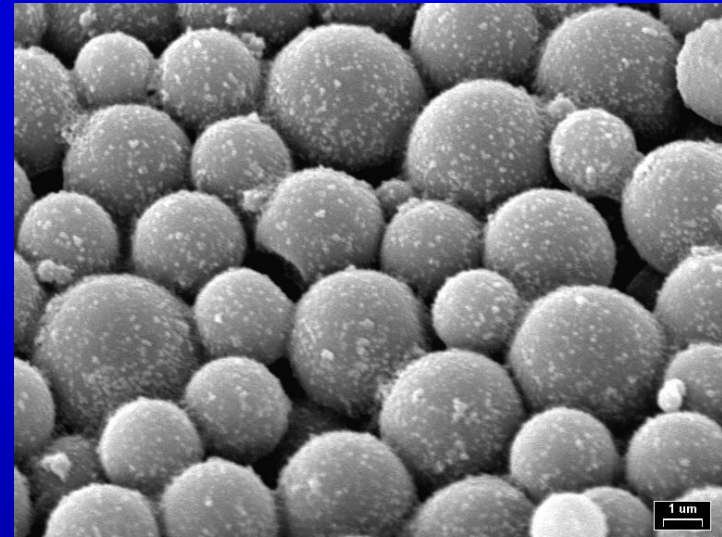
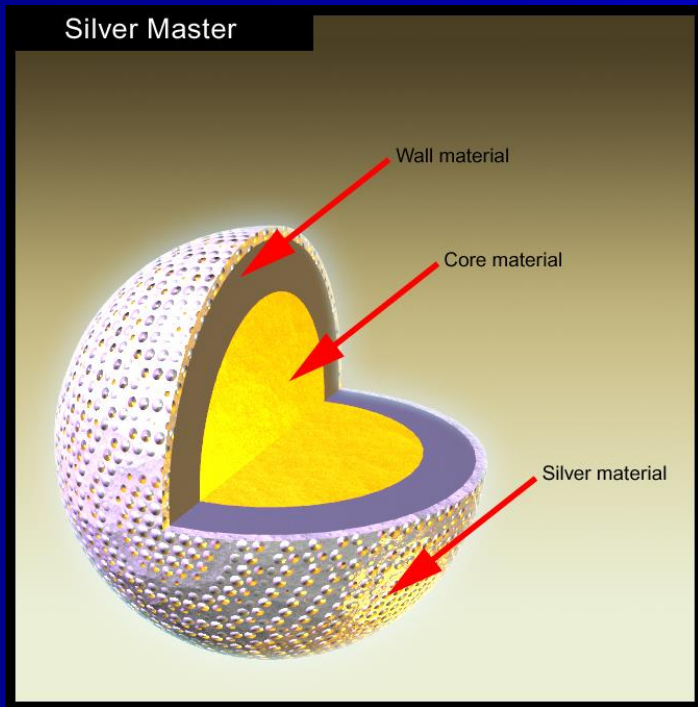
Silver Nano Microcapsule

Silver Master®

Silver Nano Microcapsule

- Polychrom developed an independence technology that can manufacture high-density **silver nano** particle by using a high-technology and developed **Silver Master[®]** by applying this to microcapsule.
- **Silver Master[®]** is a product that can maintain the **anti-microbial** capacity of silver for a long time and on a stable basis by impregnating **silver-nano particle** manufactured by using the nano particle technology to the external wall of microcapsule

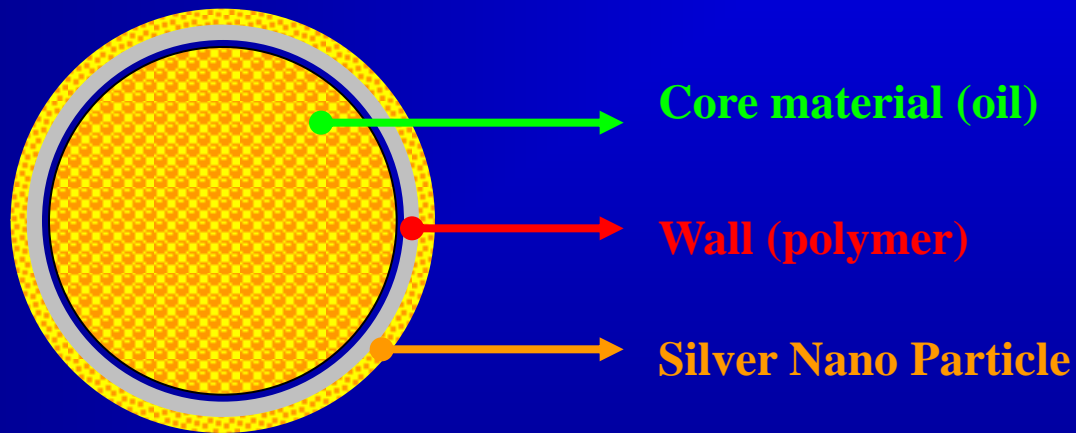
Silver Nano Particle coated Microcapsule



SEM. Photographic.

Silver nano particle coated -Wall Type

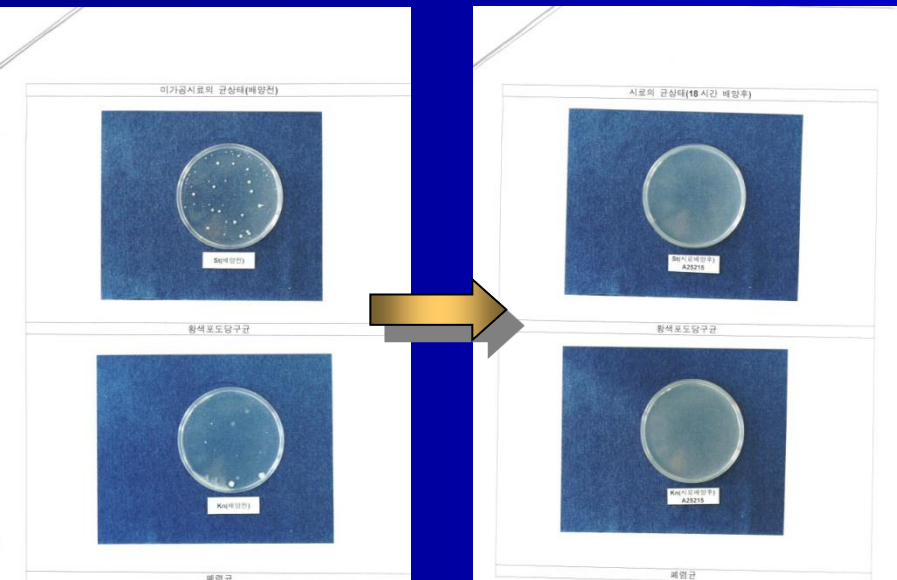
Structure of Silver Nano Microcapsule



Silver Master®

Test of anti-microbial Capability

Test Report of *Silver Master*



anti-microbial Capability 99.9 %

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 892-64 Chegidong, Tongdaemun-gu, Seoul, Korea Tel: 82-2-3299-8006/9 Fax: 82-2-3299-8150/1
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 Affiliated Organization of BOKEN, GSI, ITS
 Members of ASTM, AATCC, AAMA, IFAI, INDA
 BTG, IGS, LD, TMSJ

TEST REPORT

APPLICANT : POLYCHROM
 REPORT NO : 41-41-03-04744
 DATE : 2003-02-28

SAMPLE DESCRIPTION : ONE(1) PIECE OF KNIT FABRIC, SUBMITTED ON 2003-02-22
 ITEM : SILVER MASTER NH 2%

TEST CONDUCTED	TEST RESULTS																					
(1) ANTIBACTERIAL ACTIVITY TEST (KS K 0693-2001) : CFU/mL, BIOSTATIC REDUCTION RATE %																						
	<table border="1"> <thead> <tr> <th></th> <th>BLANK</th> <th>SAMPLE</th> </tr> </thead> <tbody> <tr> <td>BACTERIA-1 : START</td> <td>1.3×10^5</td> <td>1.3×10^5</td> </tr> <tr> <td>AFTER 18HRS.</td> <td>6.1×10^5</td> <td>1.2×10^5</td> </tr> <tr> <td>BIOSTATIC REDUCTION RATE</td> <td>—</td> <td>99.8</td> </tr> <tr> <td>BACTERIA-2 : START</td> <td>1.6×10^5</td> <td>1.6×10^5</td> </tr> <tr> <td>AFTER 18HRS.</td> <td>7.4×10^5</td> <td><10</td> </tr> <tr> <td>BIOSTATIC REDUCTION RATE</td> <td>—</td> <td>99.9</td> </tr> </tbody> </table>		BLANK	SAMPLE	BACTERIA-1 : START	1.3×10^5	1.3×10^5	AFTER 18HRS.	6.1×10^5	1.2×10^5	BIOSTATIC REDUCTION RATE	—	99.8	BACTERIA-2 : START	1.6×10^5	1.6×10^5	AFTER 18HRS.	7.4×10^5	<10	BIOSTATIC REDUCTION RATE	—	99.9
	BLANK	SAMPLE																				
BACTERIA-1 : START	1.3×10^5	1.3×10^5																				
AFTER 18HRS.	6.1×10^5	1.2×10^5																				
BIOSTATIC REDUCTION RATE	—	99.8																				
BACTERIA-2 : START	1.6×10^5	1.6×10^5																				
AFTER 18HRS.	7.4×10^5	<10																				
BIOSTATIC REDUCTION RATE	—	99.9																				

NOTE) • SAMPLE WEIGHT : 0.4g
 • AN INCREASING RATE : BACTERIA-1 : 47 TIMES
 BACTERIA-2 : 46 TIMES
 • INOCULUM CONCENTRATION : BACTERIA-1 : $1.3 \pm 0.3 \times 10^5$ /mL
 BACTERIA-2 : $1.6 \pm 0.3 \times 10^5$ /mL
 • STANDARD FABRIC(KS K 0905-1996) : COTTON
 • NONIONIC WETTING AGENT : TWEEN 80 (0.05%)
 • TEST BACTERIA : BACTERIA-1 - *Staphylococcus aureus* ATCC 6538
 BACTERIA-2 - *Klebsiella pneumoniae* ATCC 4352,
 • < = LESS THAN.
 • SEE ATTACHED PHOTOS.

SAMPLE :

FITI **FITI**

HO CHUL KIM
 EXECUTIVE DIRECTOR

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(05-A-61-1-2)
 (05-10)

REPORT NO. : 41-41-03-04744 (PAGE 1 OF 3)

Test of anti-microbial Capability

SGS Test Report of *Silver* *Master*

Test Report	1772157	Date : 12-Feb-2010	Page 2 of 2
TEST RESULT(S)			
Antibacterial Finishes on Textile Materials (Quantitative)			
(A) Sample no. I -30 wash			
Tested Microorganism	(%) Reduction		
Staphylococcus aureus (ATCC 6538)	99.79		
(B) Sample no. I - 50 wash			
Tested Microorganism	(%) Reduction		
Staphylococcus aureus (ATCC 6538)	99.91		
(C) Sample no. II - 30 wash			
Tested Microorganism	(%) Reduction		
Staphylococcus aureus (ATCC 6538)	> 99.90		
(D) Sample no. II - 50 wash			
Tested Microorganism	(%) Reduction		
Staphylococcus aureus (ATCC 6538)	> 99.90		
***** End of Report *****			

anti-microbial Capability 99.9 % after 30 or 50 washes

Apply for World Patent (PCT)

Silver-Nano Microcapsule

은나노입자가 외벽에 함침된 기능성 마이크로 캡슐의 제조방법

EP 1 458 472

PCT REQUEST		1/4	IP02PCT012
Original (for SUUMMISSION) - printed on 02.11.2002 11:36:53 AM			
8	For receiving Office use only		
8.1	International Application No.		
8.2	International Filing Date		
8.3	Name of receiving Office and "PCT International Application"		
9.4	Form - PCT/ROH01 PCT Request		
9.4.1	Prepared using	PCT-EASY Version 2.92 (updated 01.10.2002)	
9.5	Petition	The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
9.6	Receiving Office (specified by the applicant)	Korean Intellectual Property Office (RO/KR)	
9.7	Applicant's or agent's file reference	IP02PCT012	
	Title of invention	METHOD OF PREPARING FUNCTIONAL MICROCAPSULE INCORPORATING SILVER NANOPARTICLES	
10	Applicant	applicant only	
10.1	This person is:	all designated States except US	
10.2	Applicant for	POLYCHROM CO., LTD.	
10.3	Name	9B-57 Banwol industrial complex, 652-2 Choji-dong	
10.4	Address	425-866 Ansan-si, Gyeonggi-do	
10.5		Republic of Korea	
10.6	State of nationality	KR	
10.7	State of residence	KR	
10.8	Telephone No.	82-31-495-6932	
10.9	Facsimile No.	82-31-495-6632	
10.10	Applicant's registration No. with the Office	1-2002-001804-5	
11	Applicant and/or inventor	applicant and inventor	
11.1	This person is:	US only	
11.2	Applicant for	YANG, Si-Young	
11.3	Name (LAST, First)	109-503 Manyeong APT., Jeongwang-dong	
11.4	Address	429-450 Siheung-si, Gyeonggi-do	
11.5		Republic of Korea	
11.6	State of nationality	KR	
11.7	State of residence	KR	
11.8	Applicant's registration No. with the Office	4-1998-053302-0	

Macrocapsules

- Large size (1~ 10 mm)
- Natural materials (ex; gelatin, Chitosan, Sodium Alginate....)
- Water Base
- For Cosmetic, Food, House care.....

Thermochromic Microcapsule **Chameleon T Series**®

Color-change by Temperature.

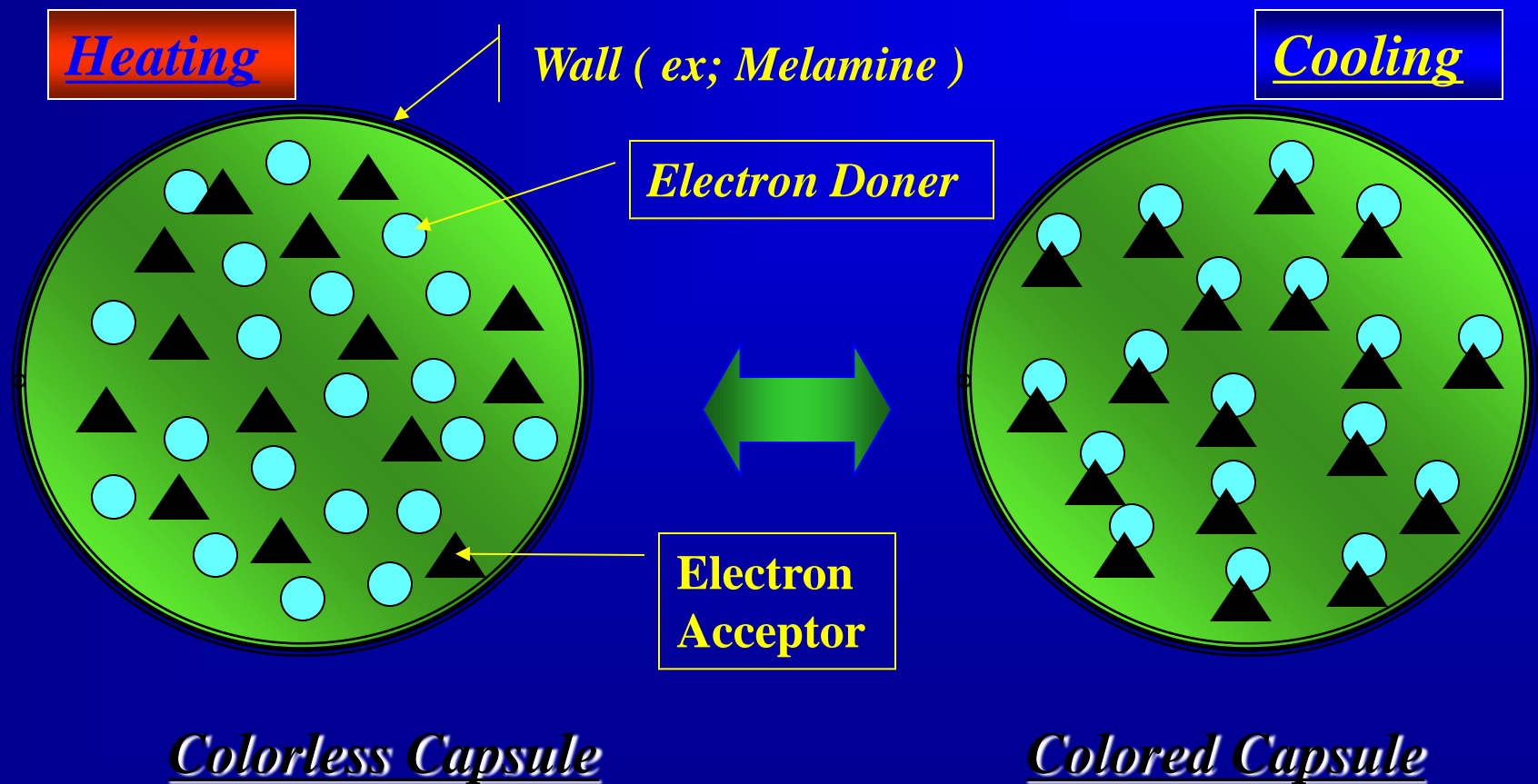
Thermochromic Type

- Reversible Type : Microcapsule

Temp Range : 0°C ~ 65°C

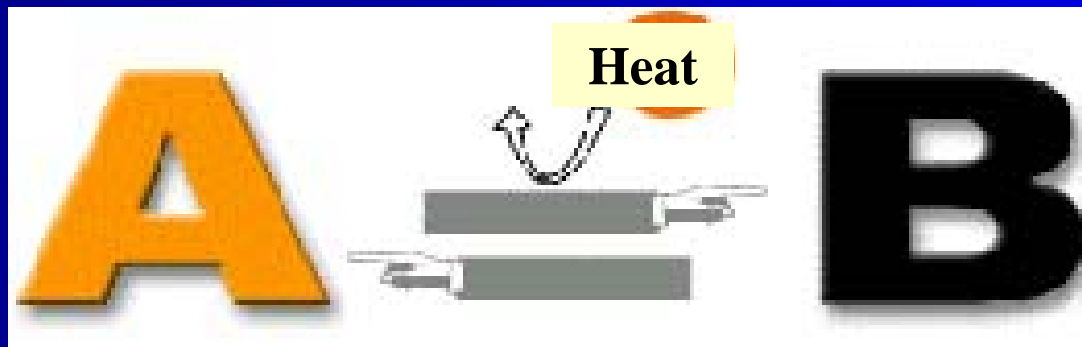
(-10°C ~ 70°C)

• Principle of Thermochromic Microcapsule



Application field for Thermochromic M/C.

Thermochromism



- ✚ Indicating Label for Food.
- ✚ Temperature Indicator
- ✚ Injection (PP, PE...)

Application field for Thermochromic M/C.

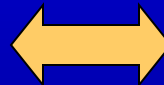
✦ For MICROWAVE PACKING LABEL

Thermochromics: Temperature-sensitive inks

Practical applications for thermochromatic inks.



Cooling



Heating

Temperature-Indicating Labels

What is Strong (Polychrom M/C) ?

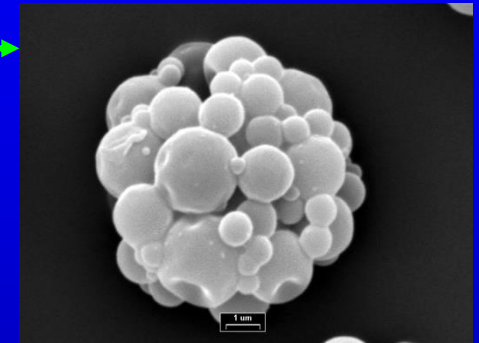
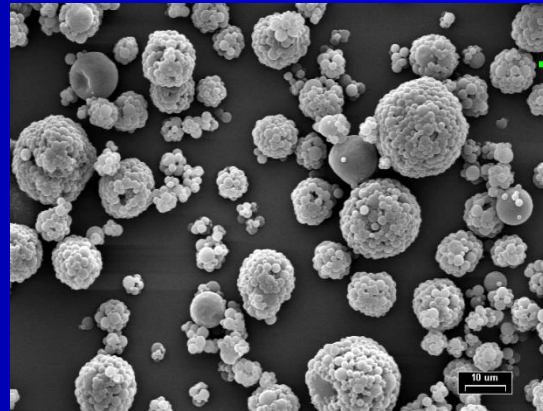
• Process of Microcapsule Powder

• **Spray Drying Process**
Agglomerated Particle
<Other company's method>

• **Chemical Drying Process**
Fine Particle
<Polychrom method>

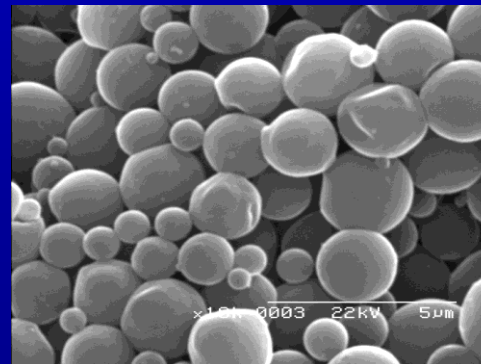
Compare Spray method with Chemical method

•Spray Drying Process



Cluster Particle

•Chemical Drying Process



fine Particle
=> Good for Ink

* Advance for CTP series

Magenta 22

		Before	After
		Old	New
TEMP (°C)	Heat	14.8~22.0 [7.2]	18.0~22.4 [4.4]
	Cool	14.5~12.8 [1.7]	19.5~16.0 [3.5]

→ Heating range gap is short, And Cooling ending point high







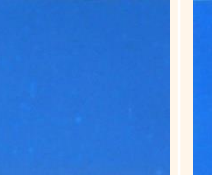




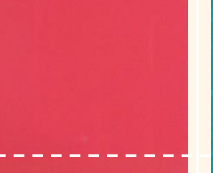

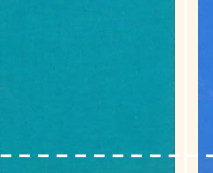

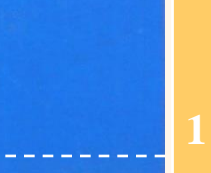
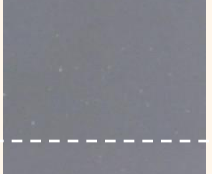

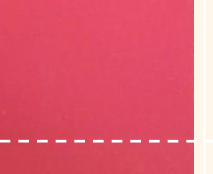
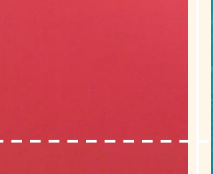

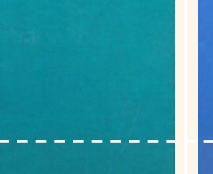

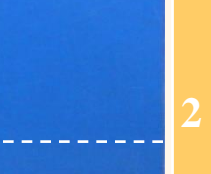
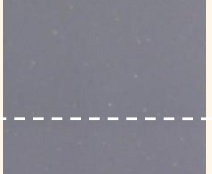




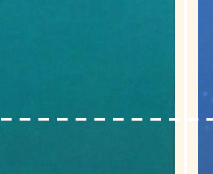


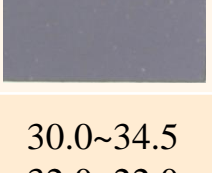
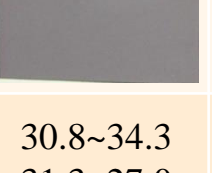
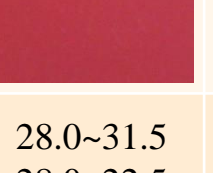
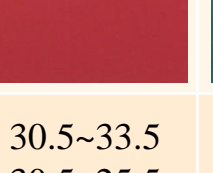
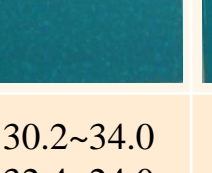
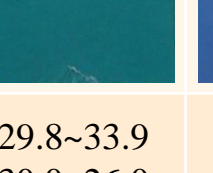

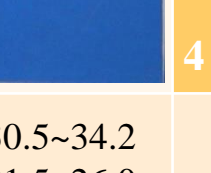
Red 28

		Before	After
		Old	New
TEMP (°C)	Heat	25.3~28.2 [2.9]	27.0~28.5 [1.5]
	Cool	25.2~22.2 [3.0]	26.8~25.0 [1.8]

→ Heating range gap is short, And Cooling ending point high



* Advance for CTP series

Black		Vermilion		TurquoiseBlue		FastBlue		色度計測値
Matsui	Poly NT	Matsui	Poly NT	Matsui	Poly NT	Matsui	Poly NT	
								0
								1
								2
								3
								4
30.0~34.5 32.0~22.0	30.8~34.3 31.3~27.0	28.0~31.5 28.0~22.5	30.5~33.5 30.5~25.5	30.2~34.0 32.4~24.0	29.8~33.9 30.0~26.0	30.5~40.0 29.0~26.0	30.5~34.2 31.5~26.0	

→Color and Temp. Range compare with Matsui

* APPLICATION using CTP series

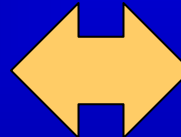
Black 70 *C, Dark Blue 70*C



Application : Instant Food, Cup Noodle, Fast Food, Retort Food

* APPLICATION using CTP series

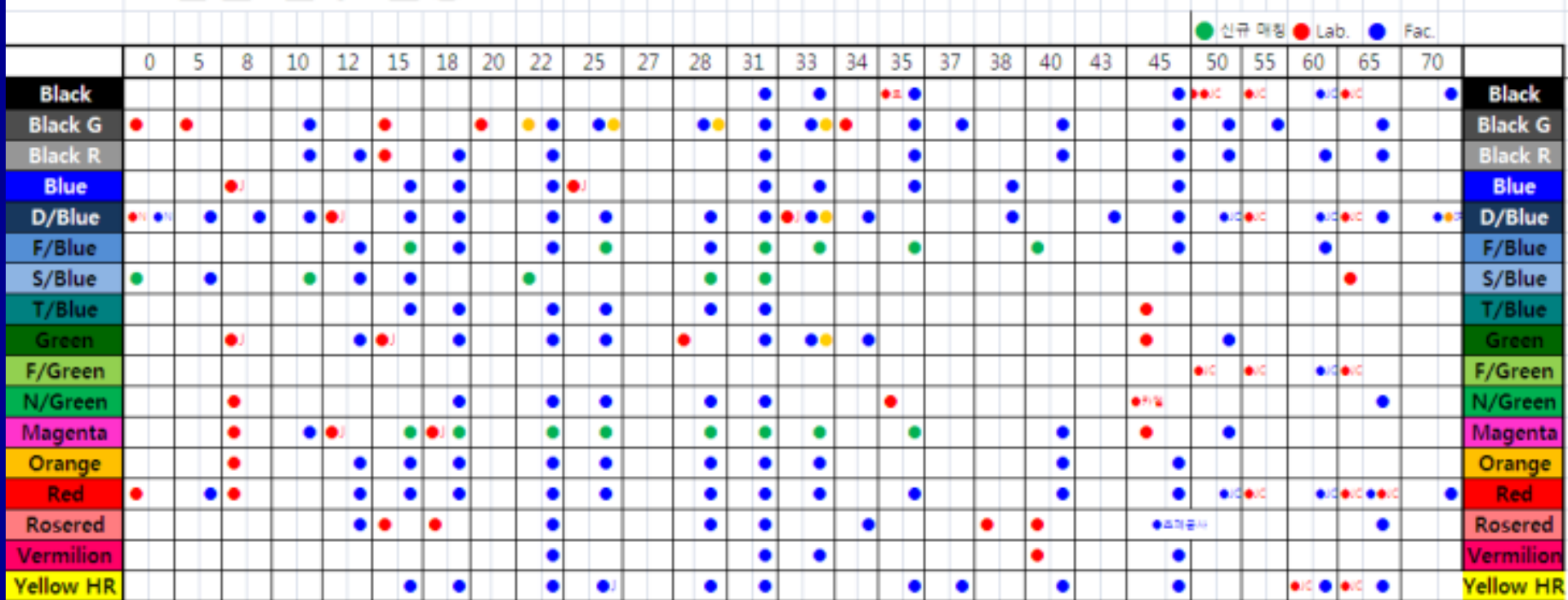
Black 70 *C, Dark Blue 70*C



Application : Instant Food, Cup Noodle, Fast Food, Retort Food

* Advance CTP series

- 감온 연구 현황 -



APPLICATION using CTP



↑ **Changed color Magic Rose (Color to Colorless)**
They make from White Rose to Color Rose using CTP Powder.
Temperature 18°C 22°C 25°C 28°C
UVC Red, Blue, Violet

↑ **England, Baby too heat in Body, Cloth to changed color.**
Color to colorless
37/38°C Blue to white
Patent : \$21,500,000 Sell to Company (name is Quality Work Ware 4 U)

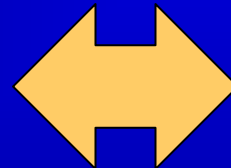
* APPLICATION using CTP series

Black 33*C



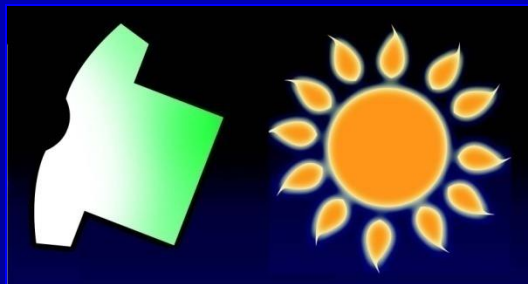
* APPLICATION using CTP series

Black 45°C

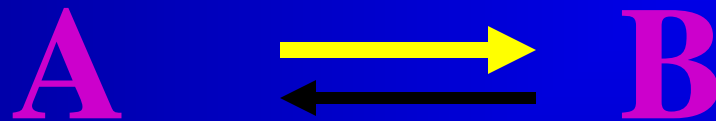


Photochromic Dyes

Photochromic dyes and Application



What is Photochromism ?

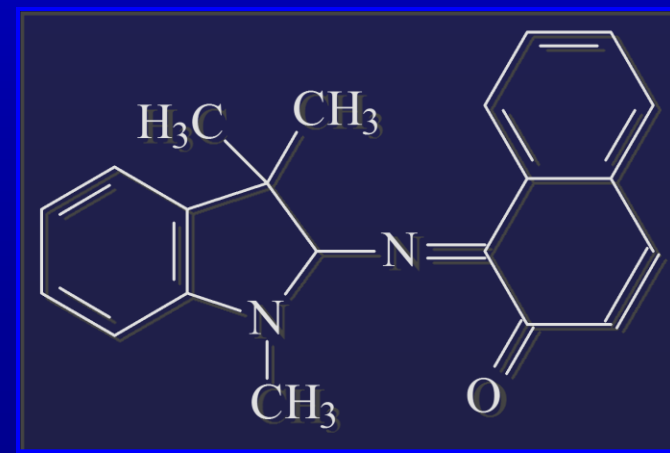
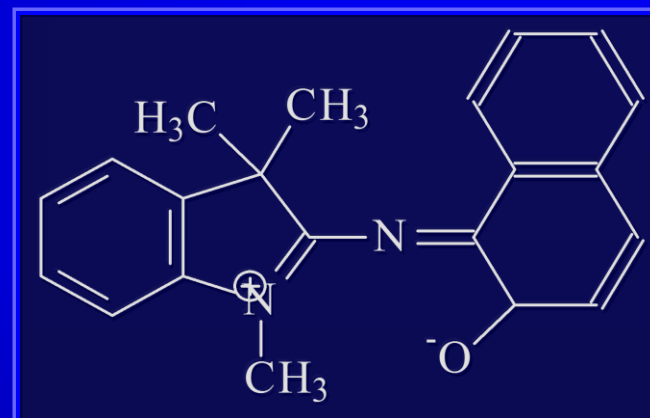
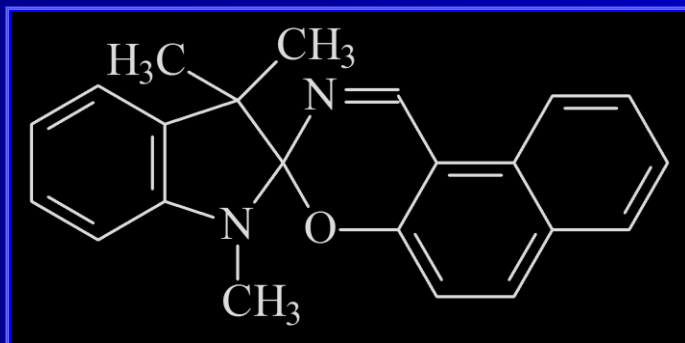


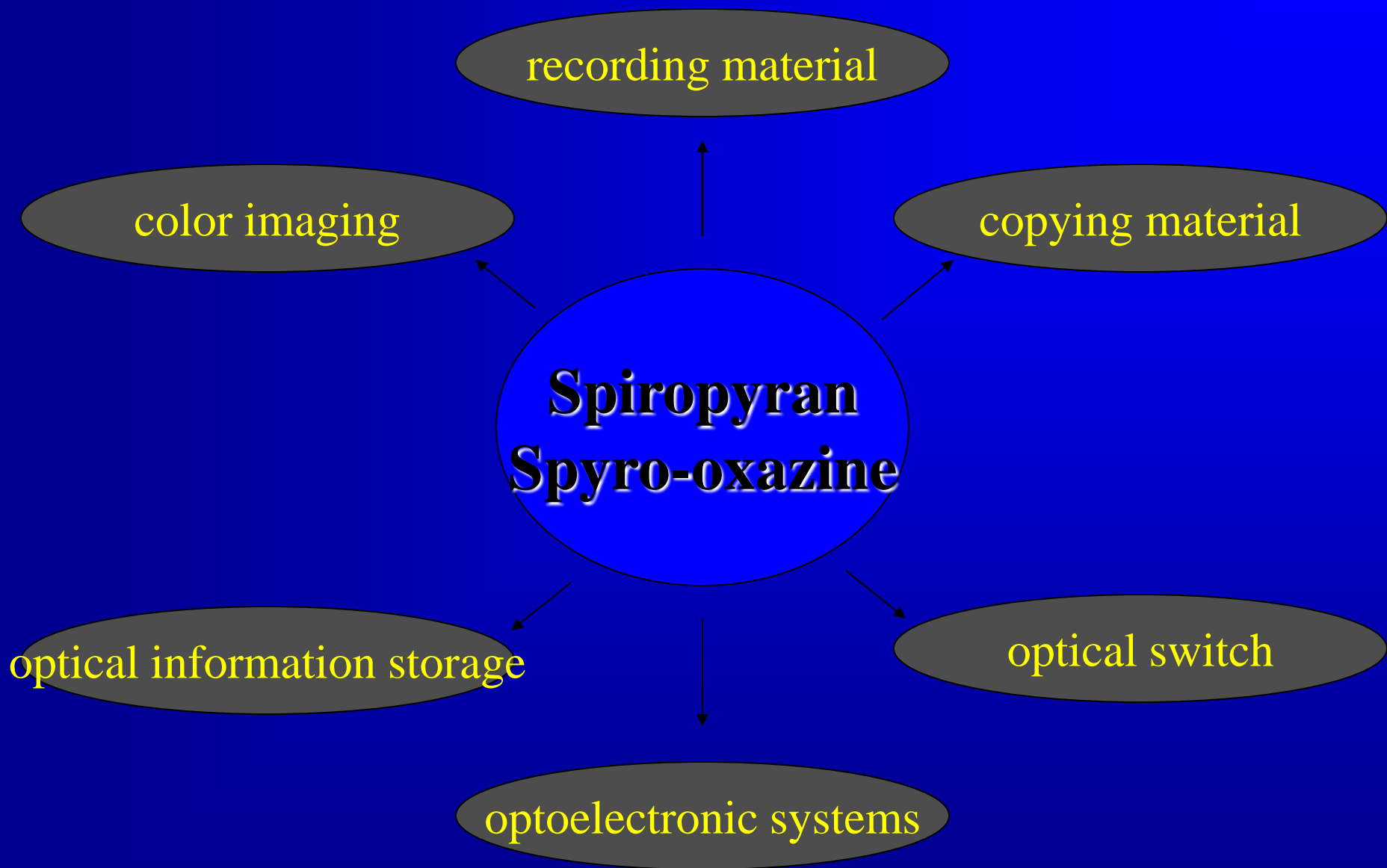
Photochromism is the process of inducing color changes in medium by incident electromagnetic radiation.

The Basic mechanism of Photochromic Dye

Ring Opening \rightleftharpoons Ring Closing

Spiro-oxazine Family







• Characteristics

• Features

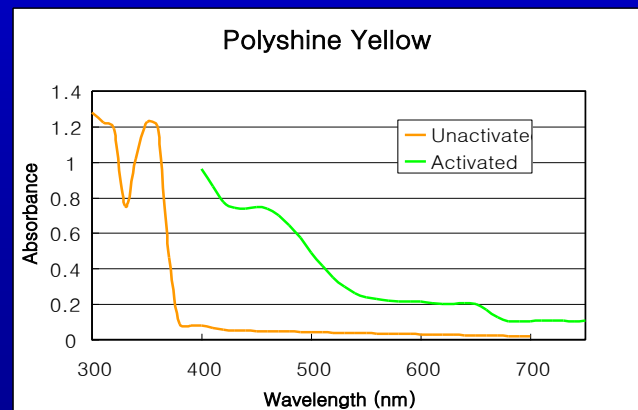
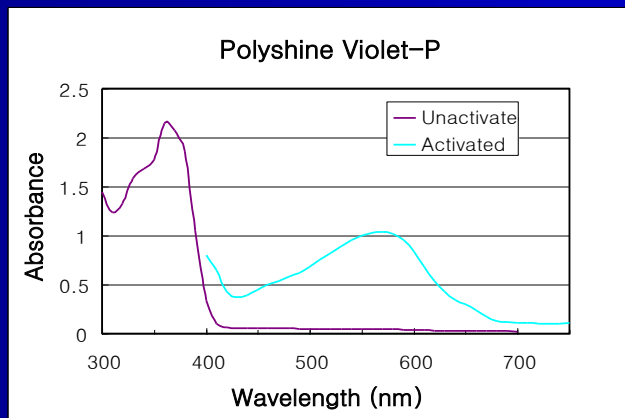
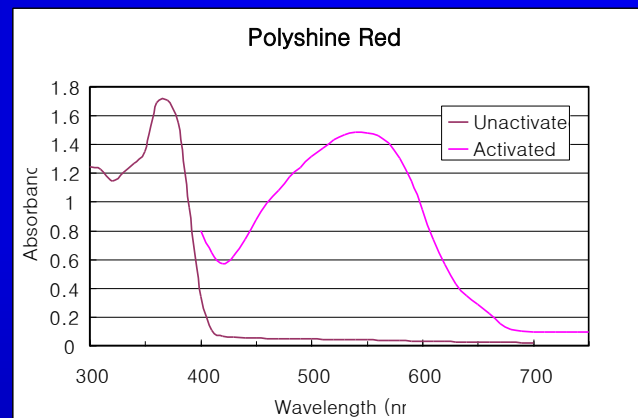
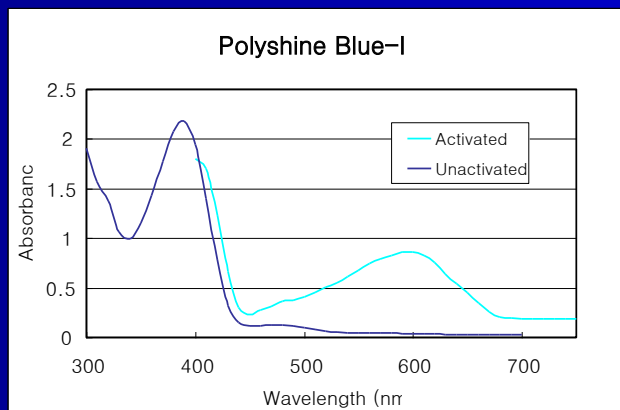
- High temp. stability
- Stable in water base media and oil base media

– Use:

Injection(PP, PE, PVC etc.)
textile printing, film coating,
cosmetics, etc.

Color	Product name	MP(°C)	LD ₅₀ (mg/kg)	Solvent	Application
Blue	PolyShine Blue-I	260	>2,000	Toluene, THF, Acetone, EtOAc, Methanol etc.	PP, PE, PVC, Rubbers etc.
	PolyShine Blue-N	140			
Red	PolyShine Red	220			
Violet	PolyShine Violet-M	195			
	PolyShine Violet-P	242			
Yellow	PolyShine Yellow	165			

Color changing peak (Before / After)

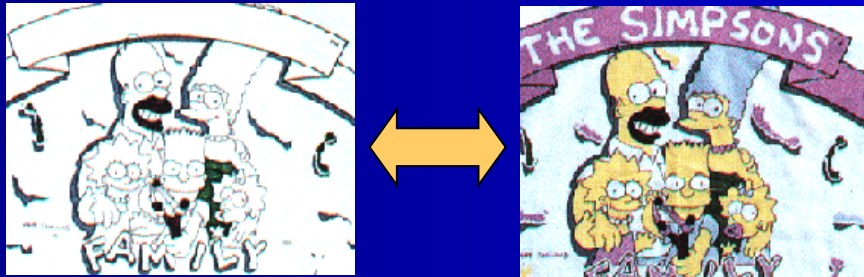


Application field

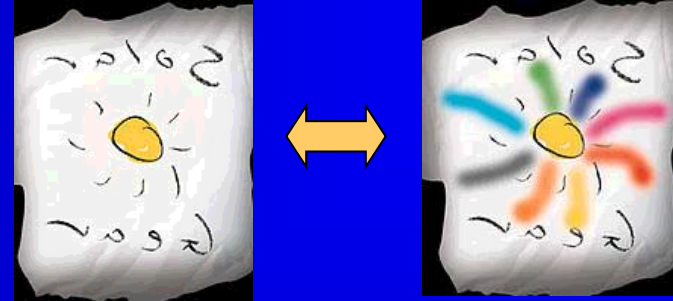
- **Printing**
- **Plastic Field (PP, PE, PVC, PU....)**
- **Lens : Sun Glass**
- **Fabric**
- **Chameleon Fiber**
- **Inks**



Silk Screen Printing

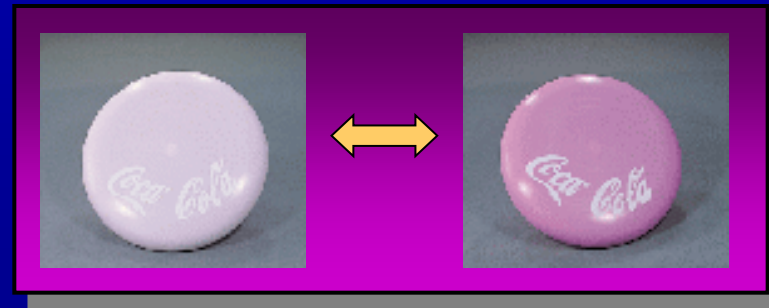
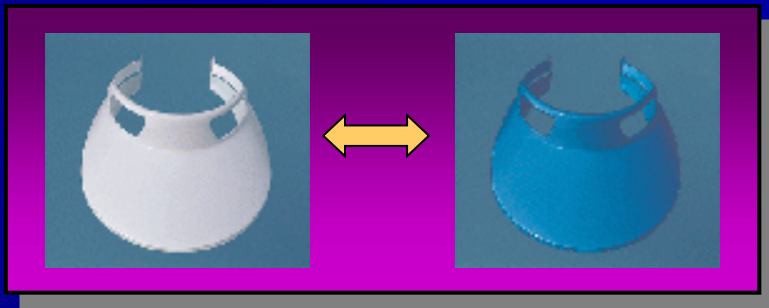
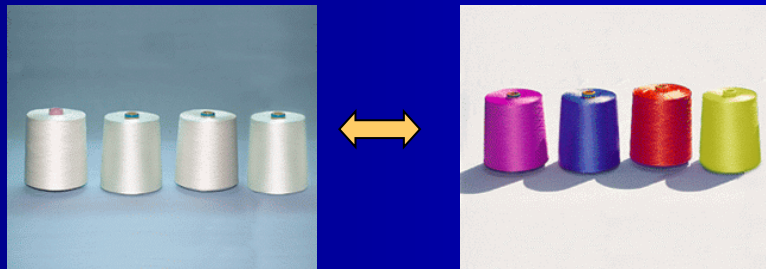


color-changing T-shirt



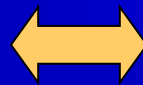
UV exposure

Photo chromic Filament.



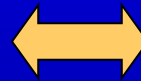
* APPLICATION for UVC series

→ Tattoo ink (Sticker) using UVC



* APPLICATION for UVC series

→ Clay using UVC



THANK YOU for LISTEN !!!



Chemical & FineChem

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E-mail: *pjy@polychrom.co.kr*