



**Everlight  
Chemical**

# 光穩定劑應用於汽車塗料的技術研究

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特用化學技術處 技術副理

台灣永光化學工業股份有限公司

2013/05/16



# 簡介(Biography)



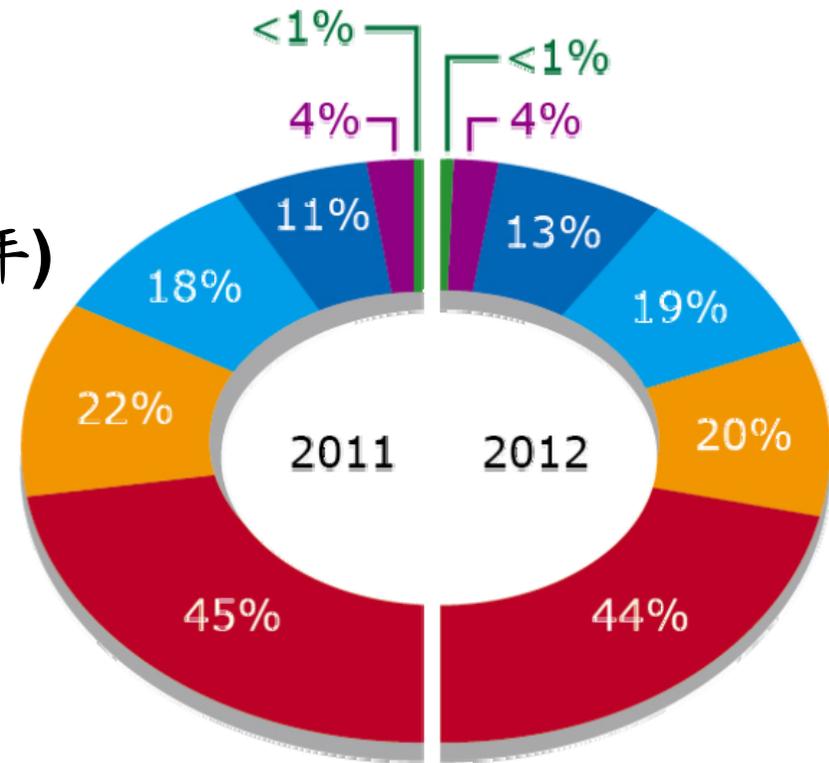
- 2003年加入特化技術團隊從事光穩定劑的研發及應用
- 2007年開發水性塗料用光穩定劑EV-AQ Series
- 2007年亞太塗料展ASIA PACIFIC COATINGS SHOW (APCS) 技術講座發表- The Novel Light Stabilizers for Waterborne Coatings
- 2009年開發光固化塗料用光穩定劑EV-UR Series
- 2010年Polymer Paint Colour Journal(PPCJ)雜誌發表-Light Stabilizers for Clear Coating
- 2010年第四屆塑膠塗料級塗裝技術研討會技術講座發表-新型的光穩定劑產品應用於塑膠塗料
- 2010年亞太塗料展Asia Pacific Coatings Journal (APCS) 技術講座發表-The Use of Light Stabilizers in Coatings with Acid Catalyzed
- 2010年第十五屆中國國際塗料展 技術講座發表-高性能複配型光穩定劑應用於水性木器塗料
- 2011年開發淺色系光固化塗料用光穩定EV-211
- 2011年開發木器預處理劑EV-SB1
- 2011年開發水性酸性色漆用光穩定劑EV-AQ5
- 2011年開發水性紫外線遮蔽劑EV-AQ6
- 2011年開發水性環氧樹脂用穩定劑EV-EP5
- 2011年塗料工業雜誌(PAINT & COATINGS INDUSTRY)第九期雜誌發表- 高性能水性複配型光穩定劑應用於南方松表面處理
- 2011年聚合塗料雜誌Polymers Paint Colour Journal (PPCJ)十月雜誌發表-Light Stabilisers for Wood Pre-treatment Applications
- 2011年亞太塗料雜誌ASIA PACIFIC COATINGS (APCJ)十月雜誌發表
- 2011年第十六屆中國國際塗料技術講座-高性能複配光穩定劑-應用於水性木器材質塗裝解決方案
- 2012年義大利雜誌發表PITTURE E VERNICI - EUROPEAN COATING 一月份雜誌發表
- 2012年三月份工研院舉辦高值化UV塗料應用商機研討會技術講座-光穩定劑在UV 光固化製程技術領域的探討
- 2012年四月份美國Coating World 雜誌發表-Light Stabilizers Make The UV Protection of Environmentally Friendly Coatings Easier
- 2012年四月份塗料雜誌Polymers Paint Colour Journal (PPCJ) 雜誌發表-Light Stabilizers for Environmentally Friendly Coatings
- 2012年八月份塗料工業雜誌(PAINT & COATINGS INDUSTRY)第八期雜誌發表- 新光穩定劑產品應用於水性環氧塗料研究
- 2012年九月份亞太塗料展ASIA PACIFIC COATINGS SHOW (APCS) 技術講座發表- The Novel Light Stabilizers for Waterborne Epoxy Coatings
- 2012年 十月份塑膠中心 技術講座發表-光穩定劑應用於乳化與UV硬化型壓克力膠的技術研究
- 2012年第十七屆中國國際塗料技術講座-高性能複配光穩定劑-應用於水性環氧塗料解決方案
- 2013年開發新型水性光固化樹脂用穩定劑EV-AQ7
- 2013年亞太塗料雜誌Asia Pacific Coatings Journal (APCJ)二月雜誌發表
- 2013年四月份最新塗料文章Polymers Paint Colour Journal (PPCJ) 雜誌發表- Novel Light Stabilizers for Waterborne UV-curable Coatings

# 大綱

- ▶ 永光化學簡介
- ▶ 塗料的裂化與防止
- ▶ 光安定劑介紹
- ▶ 汽車塗料用光穩定劑產品
- ▶ 永光產品差異化與熱穩定性
- ▶ 水性塗料用光穩定劑
- ▶ 實驗設計(DOE)手法開發新型水性環氧樹脂用光穩定劑
- ▶ UVA產品品質管理
- ▶ 結論
- ▶ 技術行銷活動介紹

# 永光化學

- 創立時間：1972年
- 資本額：新台幣45億
- 合併營收：新台幣80億 (2012年)
- 全球據點：15個營運據點  
5個生產基地
- 全球員工人數：1,500人



# 生產基地

1976 一廠 大園



1987 二廠 觀音



1992 三廠 觀音



2014 四廠 觀音



1997 全通科技



2006 蘇州永光



1996 原料藥廠



1997 電子化學廠

# 全球佈局的永光



○ Subsidiaries

□ Agents, Distributors

# 特用化學事業處簡介

- 1995成立
- 總產能：4,000 metric tons
- 員工人數：200
- 營業額：1.4 Billion NT (2011)
- 管理系統認證：
- ISO 9001：1996
- ISO 14001：1996
- OHSAS 18001：2001
- QC080000：2007

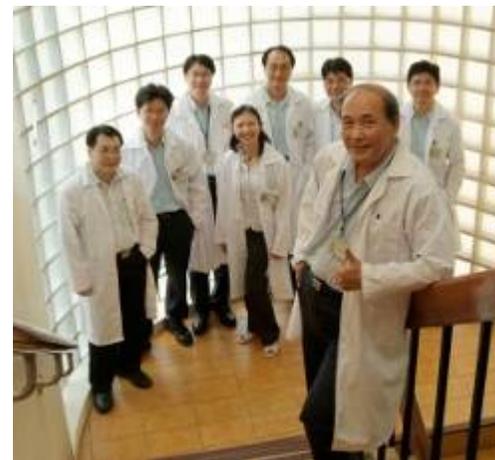
專業的光安定劑  
**Eversorb®** 生產基地



永光 三廠 觀音

# 致力於研發創新

- 研究人員：  
**200 (博士20人，碩士110人)**
- 研發費用：  
**超過2 億/年(約佔營業額 4%)**
- 專利申請：  
**110個技術取得專利，  
33個專利案申請中 (2012年3月統計)**
- 「綠能高科技化學品研發中心」獲政府政策補助



# 塗料的劣化與防止

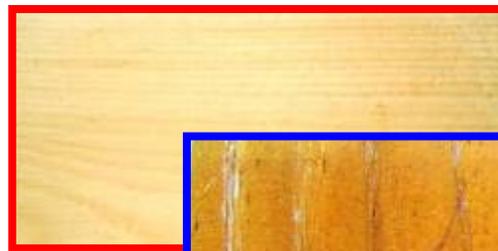
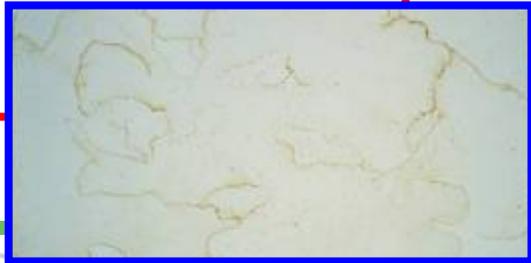
# 塗料的耐候問題

UV-light



劣化

劣化實例?

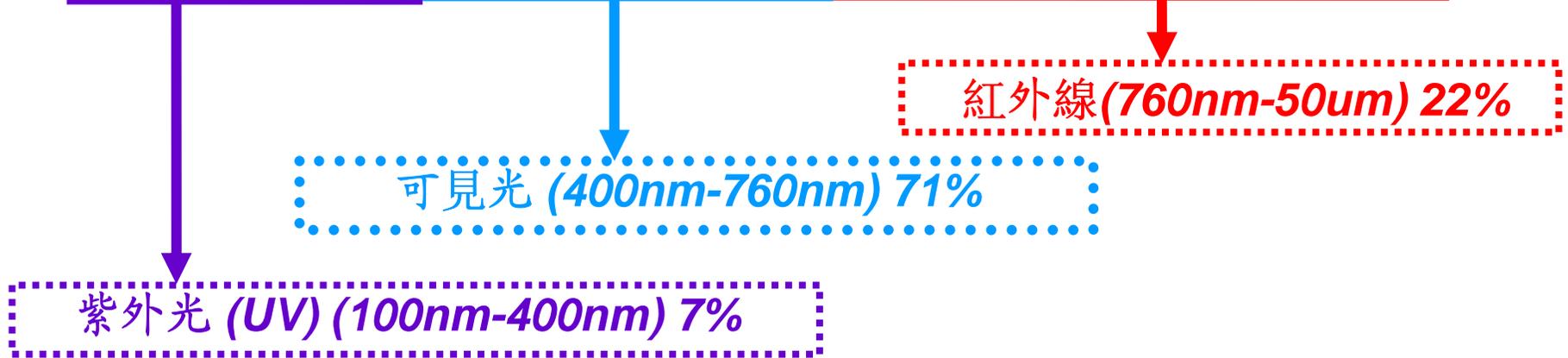
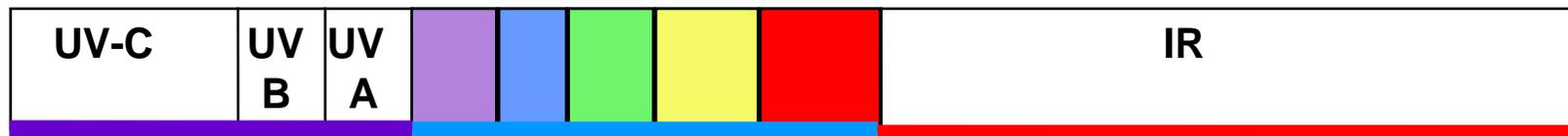
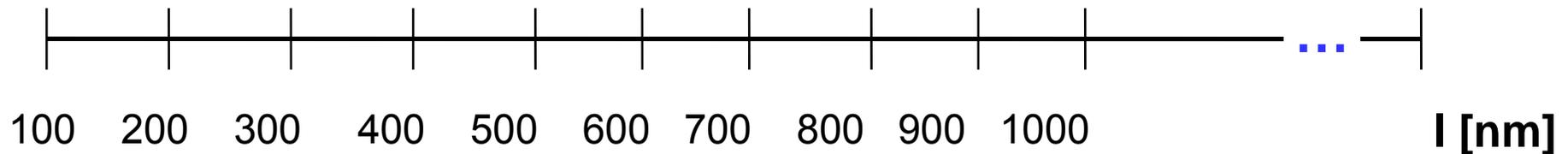


沒有光穩定劑

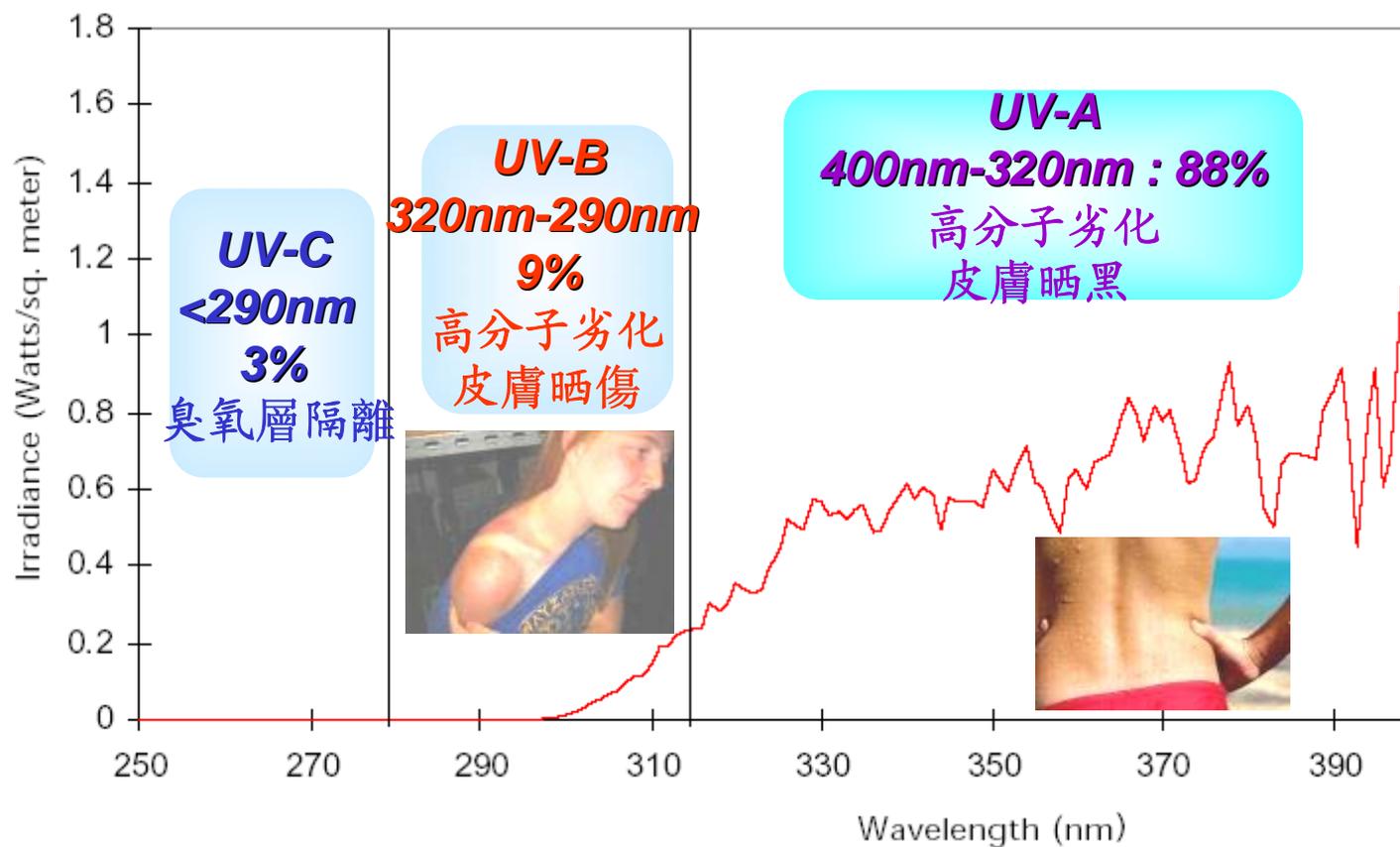
- 劣化
- 脆化
- 光澤度下降
- 分層
- 變色



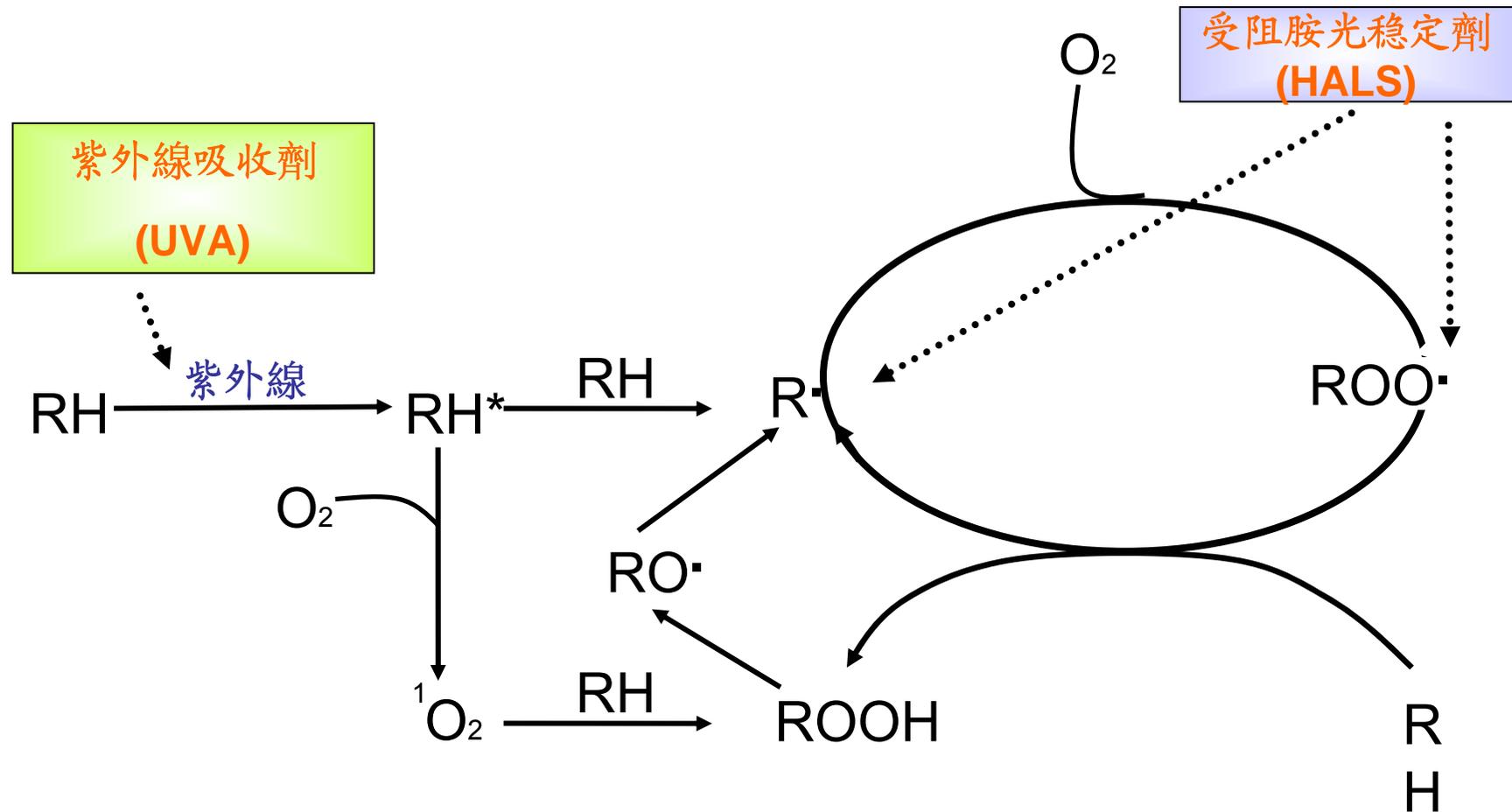
# 太陽光譜



# 紫外線光譜圖



# UVA 和 HALS 是設計改善樹脂光劣化



# 光安定劑 (Light Stabilizer)介紹



# 光安定劑的分類

- 紫外線吸收劑(UV Absorbers)
- 紫外線吸收劑主要作用是吸收有害的紫外光，吸收UV光的能量後，分子會進行互變異構（**tautomerism**）的可逆反應，透過震動釋放將所吸收的能量轉換成無害的熱而消耗掉，達到耐UV的效果。
- 受阻胺光穩定劑(Hindered Amine Light Stabilizers)
- 受阻胺光穩定劑（HALS）無法吸收紫外線，其作用機制為piperidine環上的氮原子會去捕捉自由基，使其陷入一個**modified Denisov Cycle**，使自由基無法繼續對分子鏈作進一步的破壞攻擊，而達到安定的效果。

# 使用光穩定劑考慮的要點

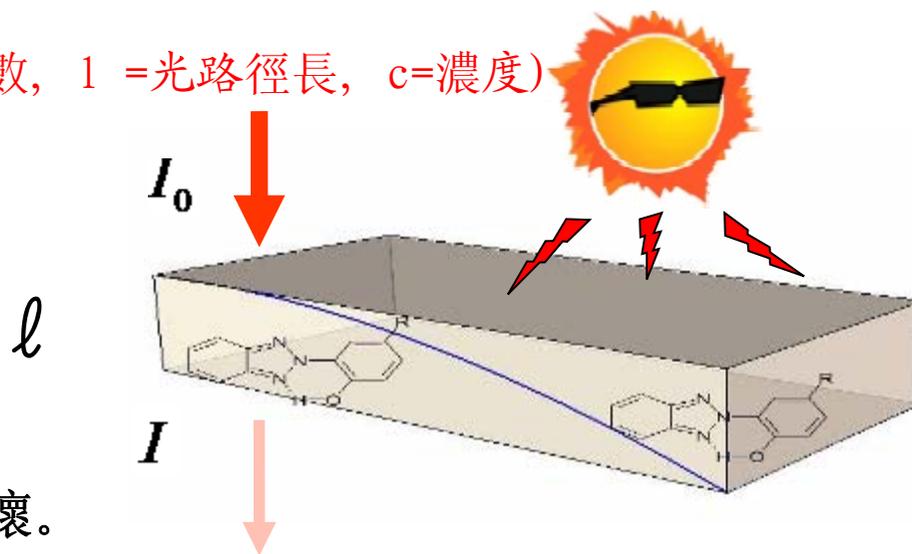
## 紫外線吸收劑(UVA)

用於吸收有害紫外光，以避免基材暴露於輻射線下。受到比耳定律所支配，取決於膜厚、濃度、消光係數和吸收光譜範圍等影響。

$$A = -\log_{10}\left(\frac{I}{I_0}\right) = \epsilon lc$$

- ❖ UVA吸收紫外光的效果會遵守Beer 's Law，與UVA濃度及光徑長相關！

(A=吸收度， $\epsilon$ =莫耳消光係數， $l$ =光路徑長， $c$ =濃度)



## 受阻胺光穩定劑(HALS)

阻止劣化所產生自由基的持續性破壞。  
有效性受到基材酸鹼性環境的影響。

# UVA 與HALS相互作用-相乘效果

紫外線吸收劑與**HALS**併用：

紫外線吸收劑可在塗膜表面吸收有害的紫外線

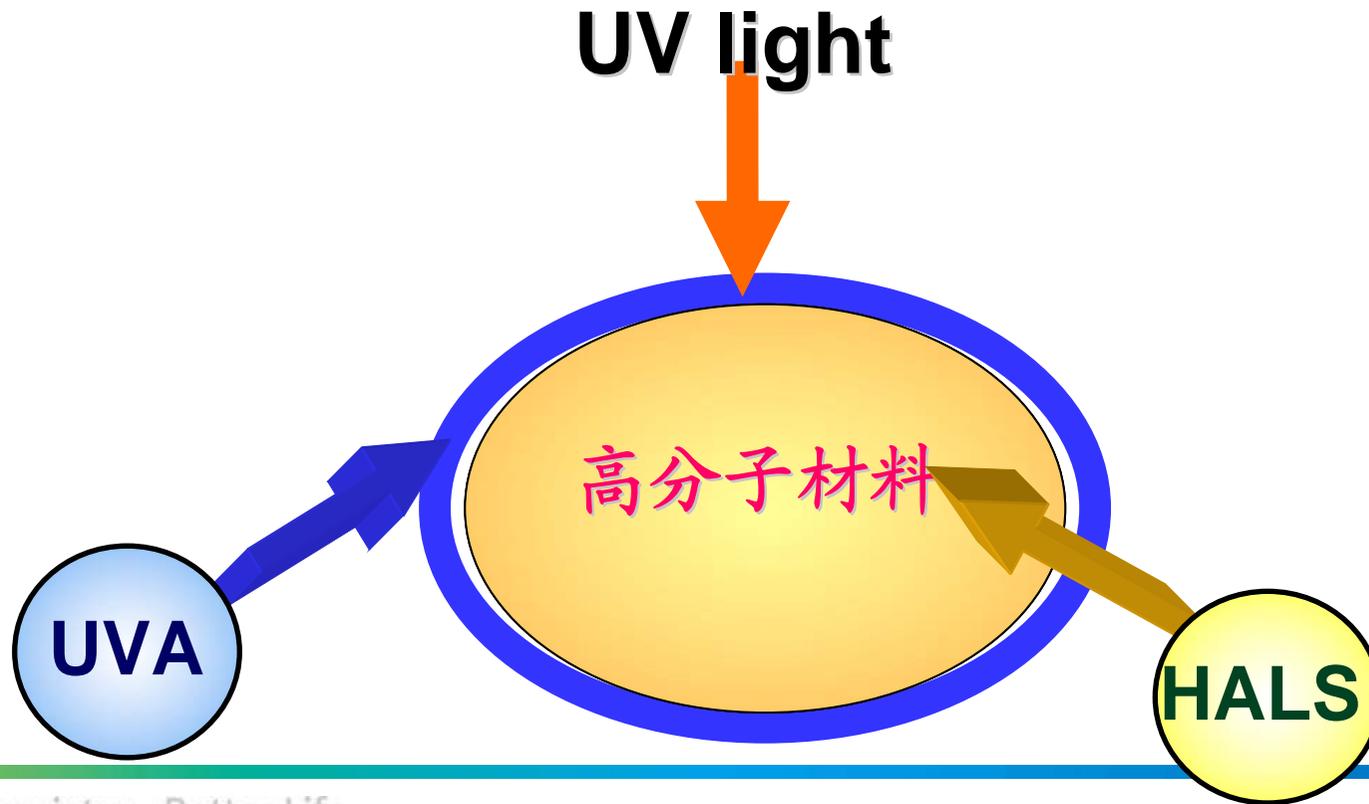
→ 防止顏色變化及光澤度降低。

**HALS**則在塗膜內部進行保護的作用

→ 防止光澤度降低及龜裂。

# 光安定劑的協同效應

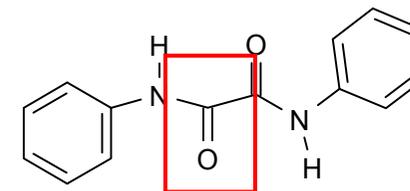
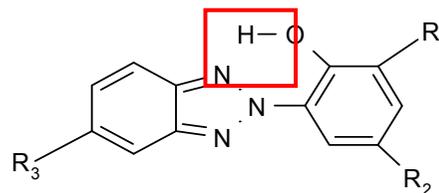
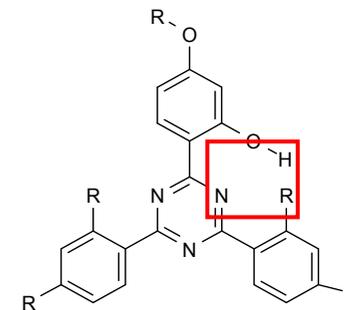
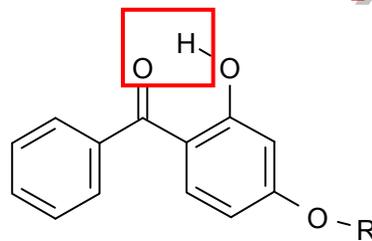
UVA與HALS搭配使用時，會產生協同效應提供高分子材料更好的防護作用



# 光安定劑的分類 (UVA/HALS)

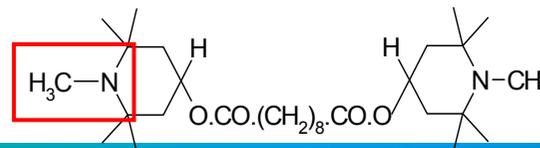
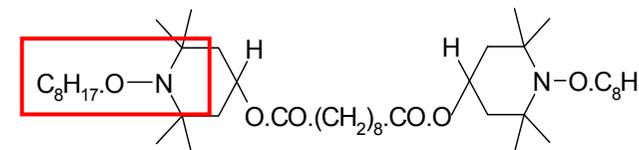
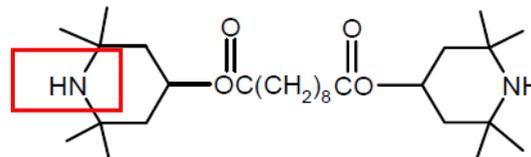
## UV Absorbers

- Benzophenone type
- Benzotriazole type
- Triazine type
- Oxanilide type

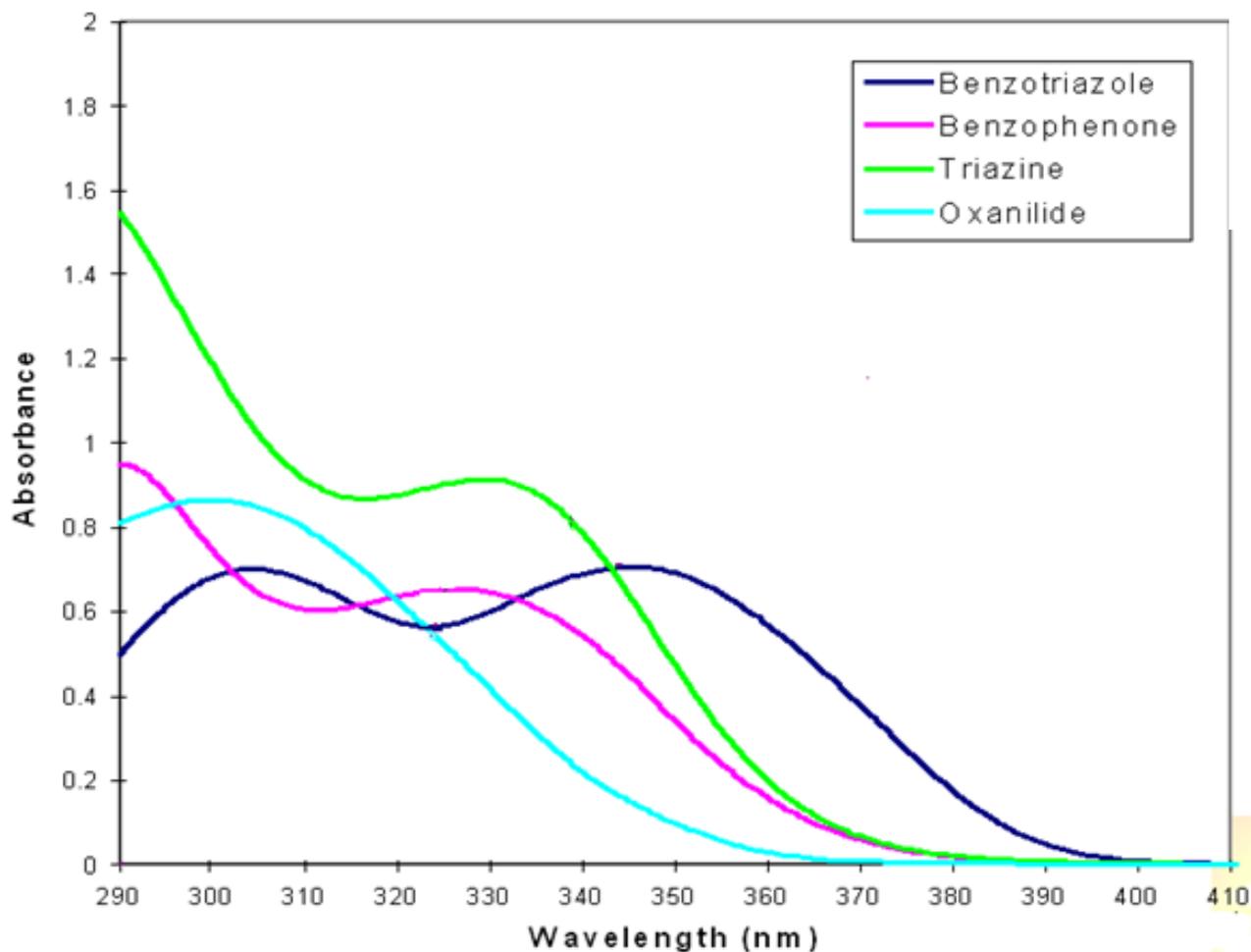


## HALS

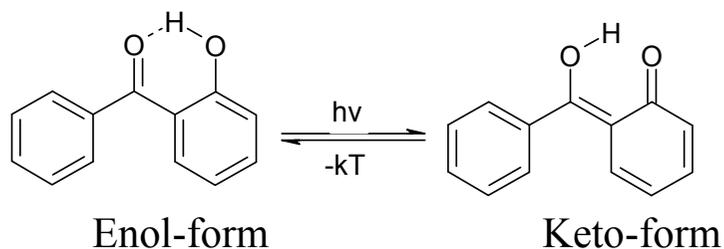
- N-H type
- N-R type
- N-OR type



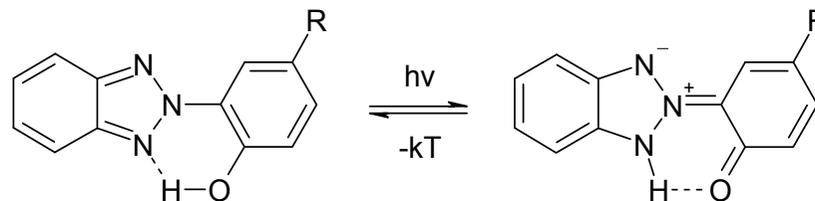
# 不同類型UVA吸收圖譜



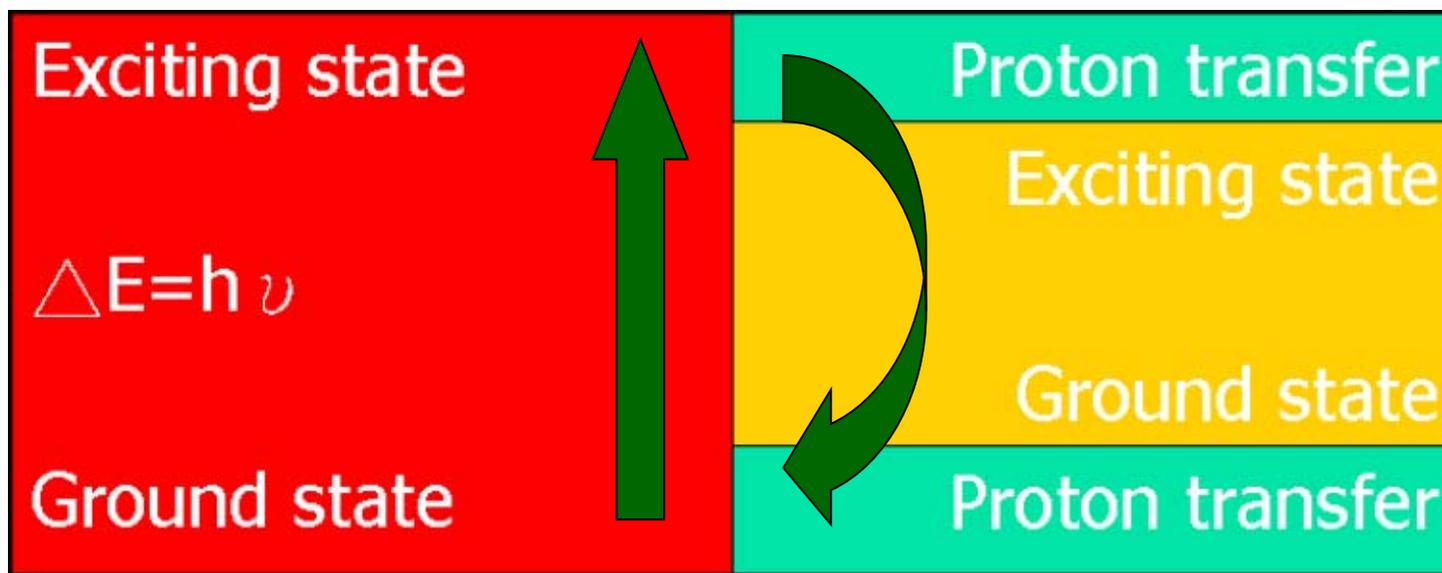
# UVA對光的反應機制



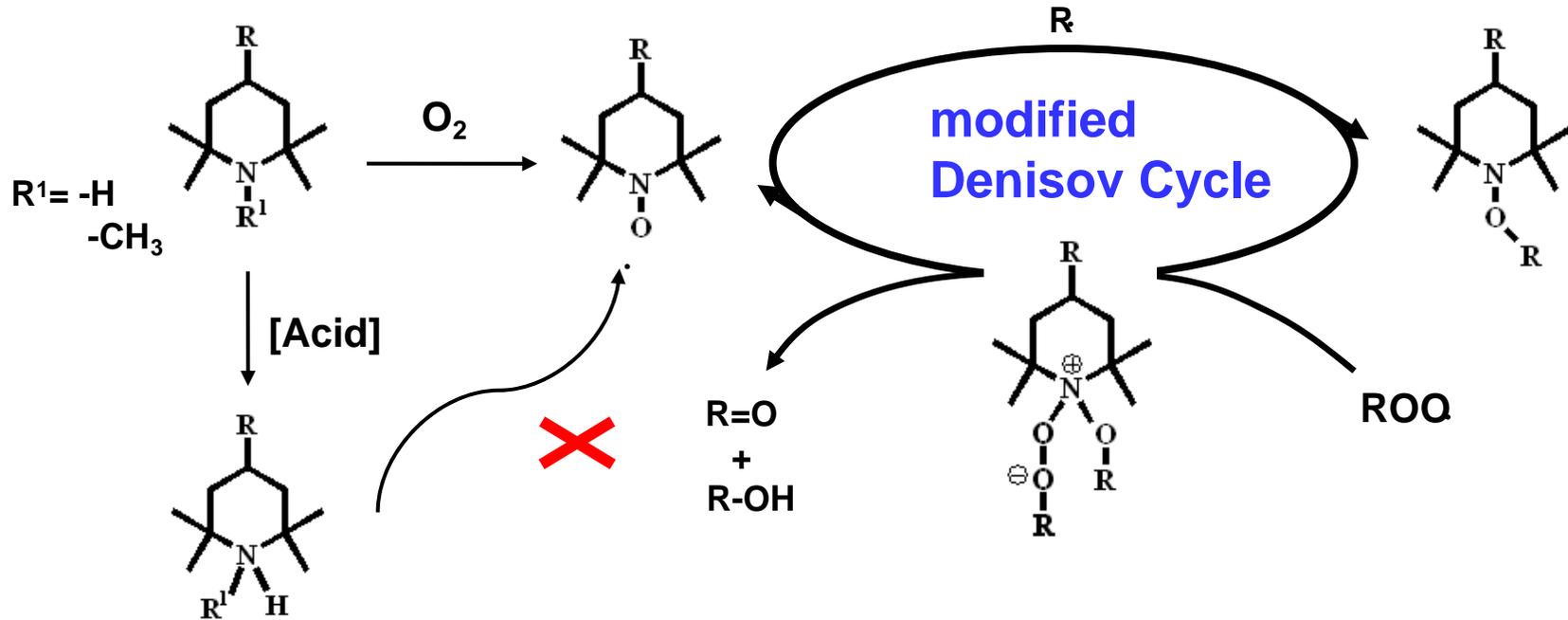
*Benzophenone*



*Benzotriazole*



# HALS對自由基的反應機制



在酸性的環境下，為了避免HALS功能失效，則須添加  
**N-OR HALS !(Eversorb 95)**

# Eversorb® 光穩定劑應用領域



**綠能產業**  
Green Energy Industries



**光電產業**  
Optoelectronic Industries



**化妝品**  
Cosmetics

**汽車塗料**  
Automotive Coatings



**塑膠產業**  
Plastic Industries

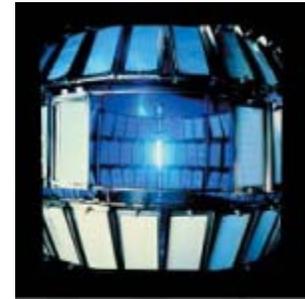
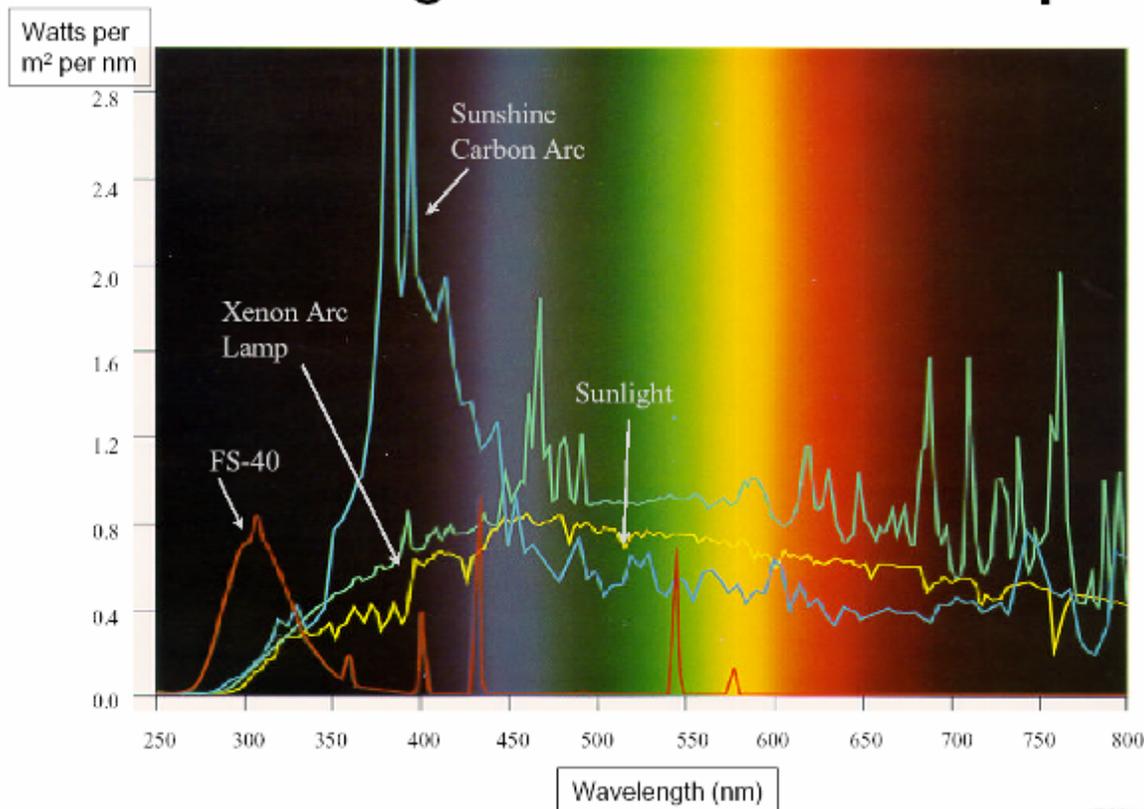


**運動用品**  
PU / TPU sports goods



# 人工加速老化實驗

陽光中引起高分子材料破環的波長主要集中在紫外線及部分可見光。國際標準化組織(ISO)中與高分子材料相關的各技術委員會主要推薦使用陽光型碳弧燈、熒光紫外燈、氙弧燈三種光源。



# 耐候加速實驗規範

## ASTM G154/G155

Designation: G 154 – 06

Standard Practice for  
Operating Fluorescent Light Apparatus for UV Exposure of  
Nonmetallic Materials<sup>1</sup>



Cycle	Lamp	Typical Irradiance	Approximate Wavelength	Exposure Cycle
1	UVA-340	0.89 W/m <sup>2</sup> /nm	340 nm	8 h UV at 60 (± 3) °C Black Panel Temperature; 4 h Condensation at 50 (± 3) °C Black Panel Temperature
2	UVB-313	0.71 W/m <sup>2</sup> /nm	310 nm	4 h UV at 60 (± 3) °C Black Panel Temperature; 4 h Condensation at 50 (± 3) °C Black Panel Temperature

Designation: G 155 – 00a<sup>ε1</sup>

Standard Practice for  
Operating Xenon Arc Light Apparatus for Exposure of Non-  
Metallic Materials<sup>1</sup>

Cycle	Filter	Irradiance	Wavelength	Exposure Cycle
1	Daylight	0.35 W/m <sup>2</sup> /nm	340 nm	102 min light at 63 (±2.5) °C Black Panel Temperature 18 min light and water spray (air temp. not controlled)

Better Chemistry Better Life

# 常用的顏色判別指標

黃色指數(Yellowness index YI)

數值越大表示越黃

黃變指數(Yellowness difference  $\Delta YI$ )

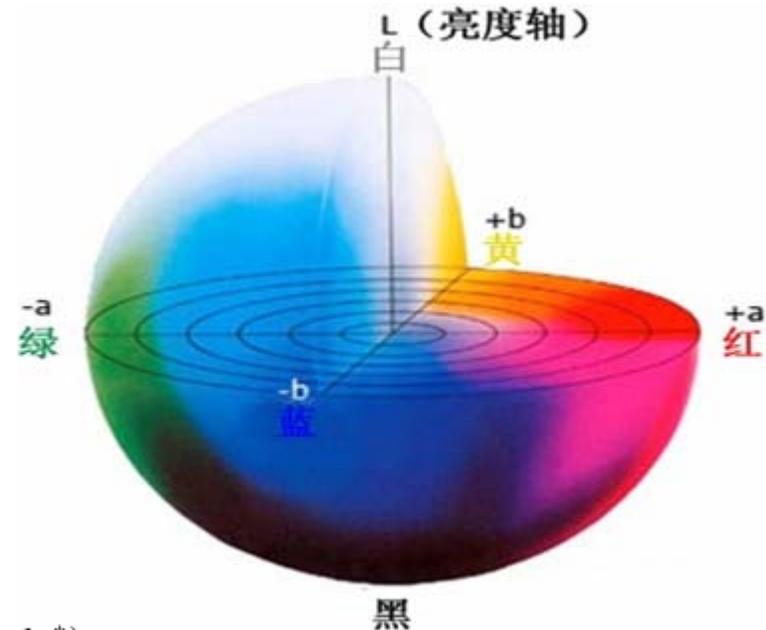
數值越大表示黃變程度越大

CIE L\*a\*b\* (CIELAB)

L\* (明度): 值越大越白

a\* (紅綠軸): +值偏紅 -值偏綠

b\* (黃藍軸): +值偏黃 -值偏藍



色差指數(Color difference  $\Delta E$ )

L\*a\*b\* 中的兩個顏色  $(L_1^*, a_1^*, b_1^*) (L_2^*, a_2^*, b_2^*)$

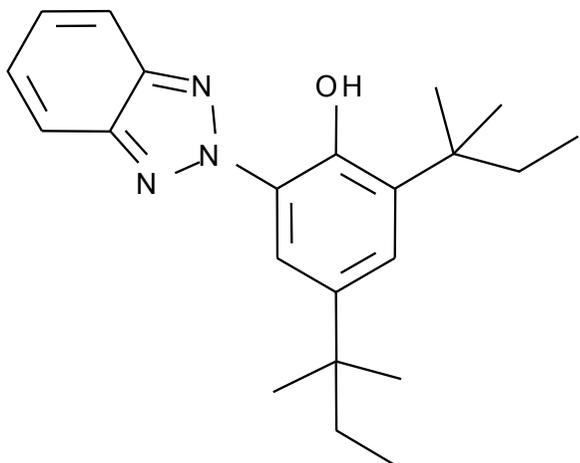
$$\Delta E_{ab}^* = \sqrt{(L_2^* - L_1^*)^2 + (a_2^* - a_1^*)^2 + (b_2^* - b_1^*)^2}$$

數值越大表示前后顏色變化程度越大

# 汽車塗料用光穩定劑產品

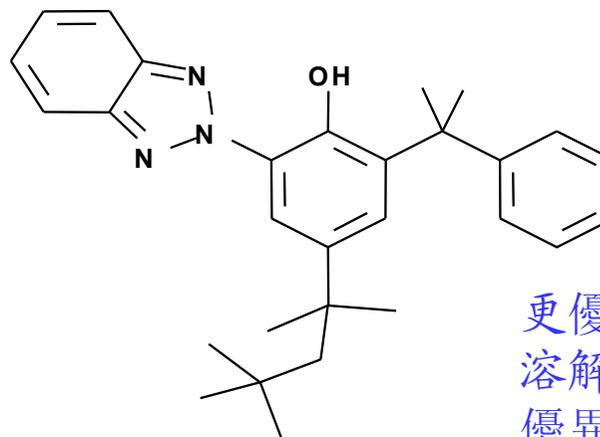


# 永光化学-提供汽車塗料用 固體型-光穩定劑產品(UVA)



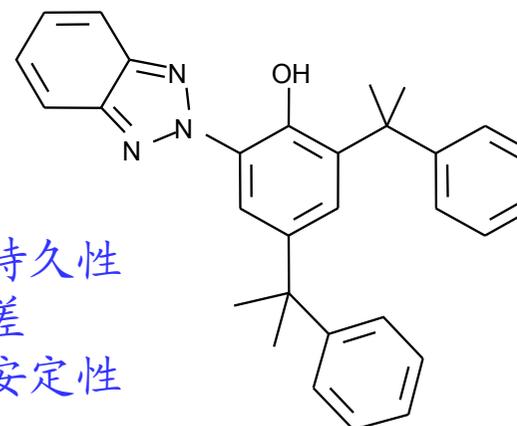
**EVERSORB® 74**

低分子量  
一般的熱安定性  
好的光持久性



**EVERSORB® 89**

更優異的光持久性  
溶解度較好  
優異的熱安定性

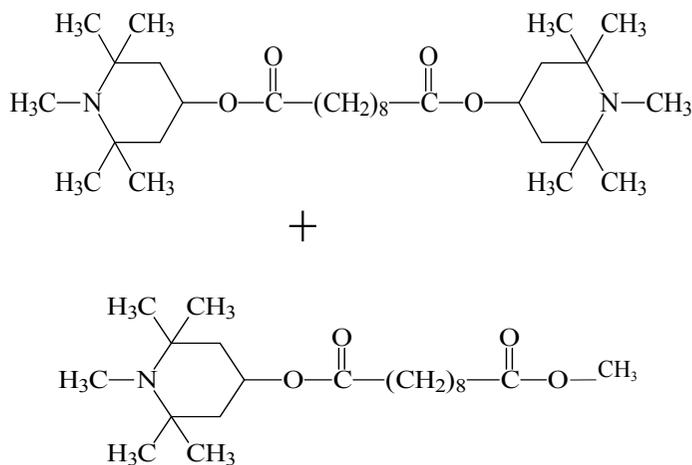


優異的光持久性  
溶解度較差  
優異的熱安定性

**EVERSORB® 76**



# 永光化学-提供汽車與塗料用 光稳定剂产品(HALS)



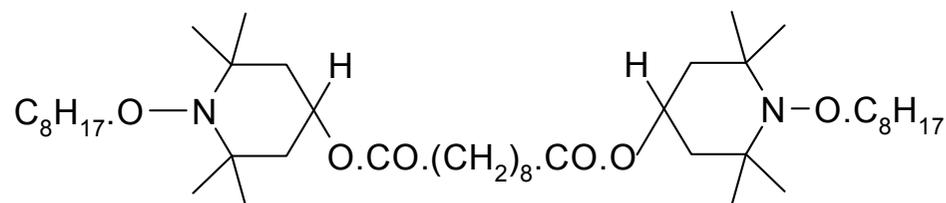
## EVERSORB® 93/93C

适用于弱酸或非酸性材质  
液体

N-R Head Group  $-pK_b = 5-6$

**EVERSORB® 93** : 一般规格 **APHA 50-70**

**EVERSORB® 93C**: 特殊规格 **APHA  $\leq 50$**



## EVERSORB® 95

適用於酸性材質  
液体

N-OR Head Group  $-pK_b = 9-10$

# Eversorb® 95 – 液態 NOR HALS

不會與酸性材料作用

醇酸樹脂(AK)



AK+1% N-R HALS



AK+1% N-OR HALS

# 汽车涂料的推荐

## 透明涂料

(依据树脂固含量添加)

透明涂料
底漆涂料
填充料
电着涂料
车体

车体涂装构成图

**UVA : EV81 or EV80 or EV89 or EV76 or EV74**

**1 - 2%**

**HALS: EV93 or EV95**

**0.5 - 1 %**

**UVA:HALS 比例爲 2-2.5:1**

**複配產品: EV-83, EV-84, EV85**

**1.5-3%**

## 色漆:

**HALS : EV93 or EV95**

**1 - 2 %**

**UVA : EV81 or EV80 or EV89 or EV76 or EV74**

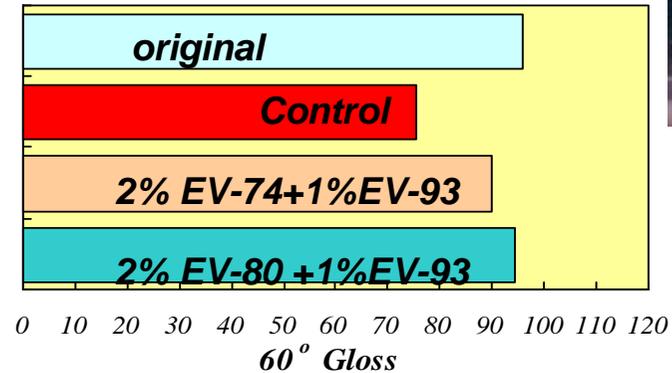
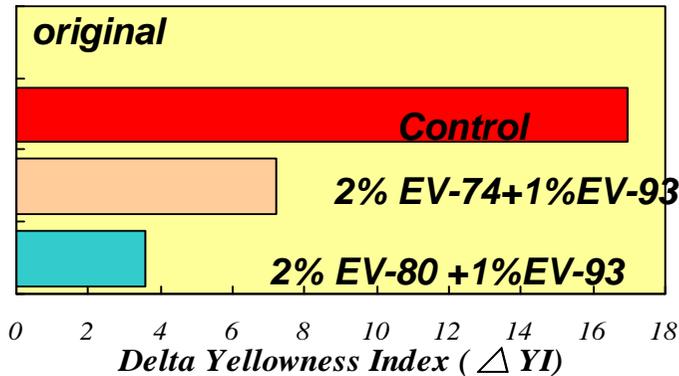
**0 - 1 % (取决于颜料部分)**

透明涂料 + 底漆涂料 = 面漆

# 提升修補漆耐黃變及光澤度保留率

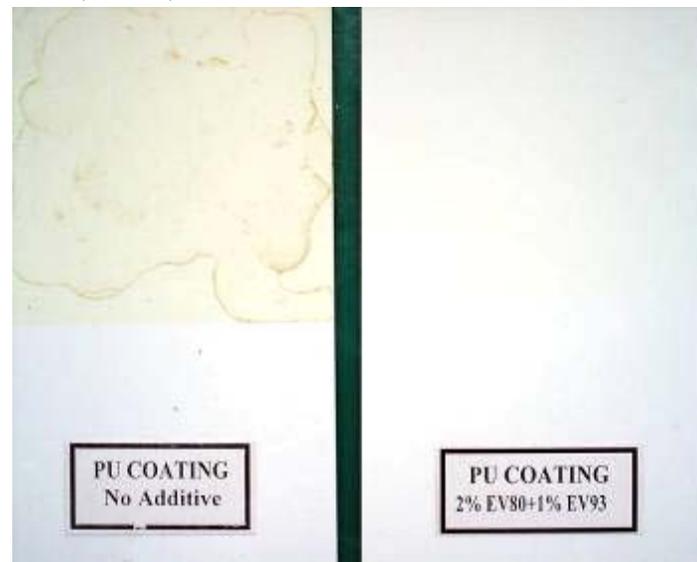
樹脂：透明聚氨酯(PU)涂料  
 曝曬裝置：QUV-313nm

測試方法：ASTM G154-2  
 曝曬時間：1000小時



測試后

測試前



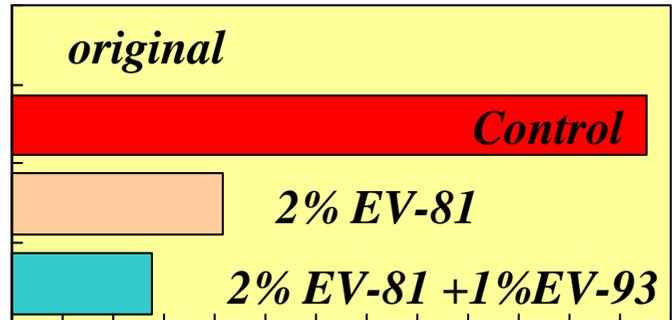
# 提升烤漆耐黄变及光泽度保留率



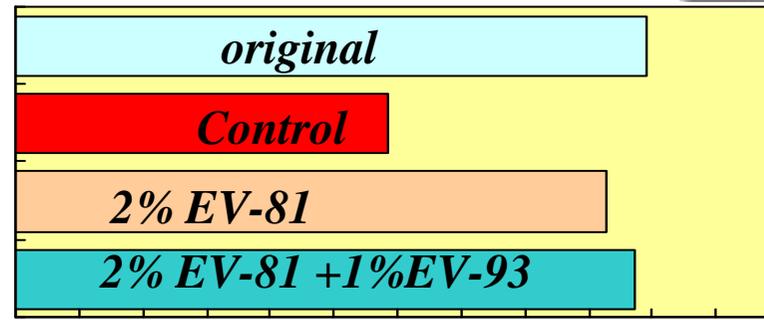
树脂: 透明丙烯酸(AC)涂料

暴晒时间: 2000小时

测试方法: ASTM G154-2(Q-U-V 耐候试验机含 UVB-313 光源)



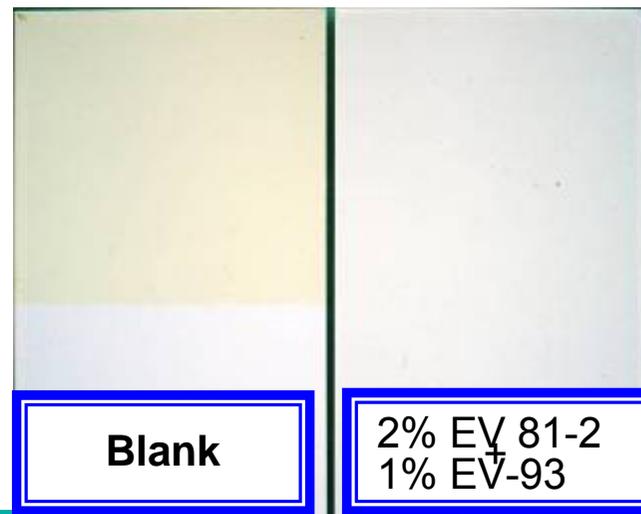
0 2 4 6 8 10 12 14 16 18 20 22 24 26  
Delta Yellowness Index ( $\Delta YI$ )



0 10 20 30 40 50 60 70 80 90 100 110 120  
60° Gloss

测试后

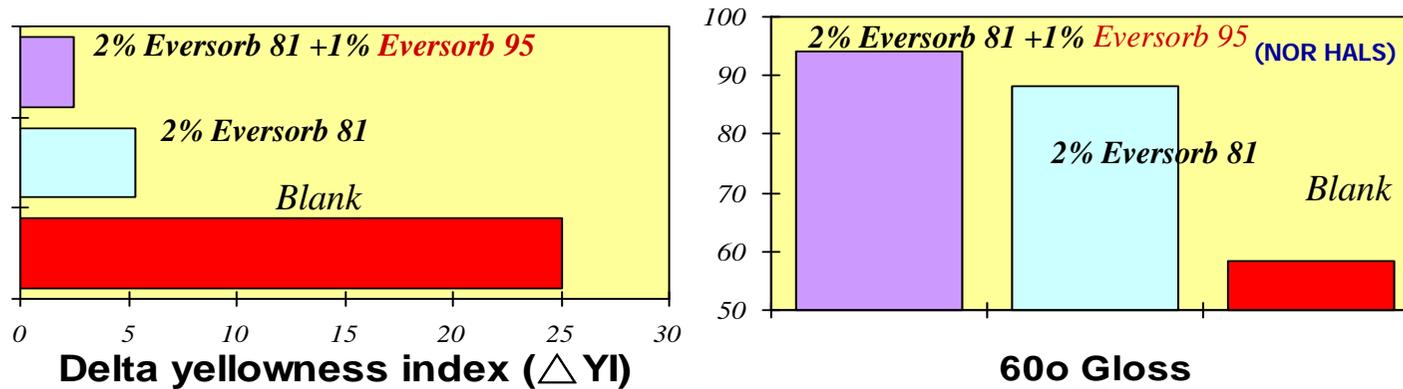
测试前



# 提升烤漆(高固含量)耐黄变及光泽度保留率



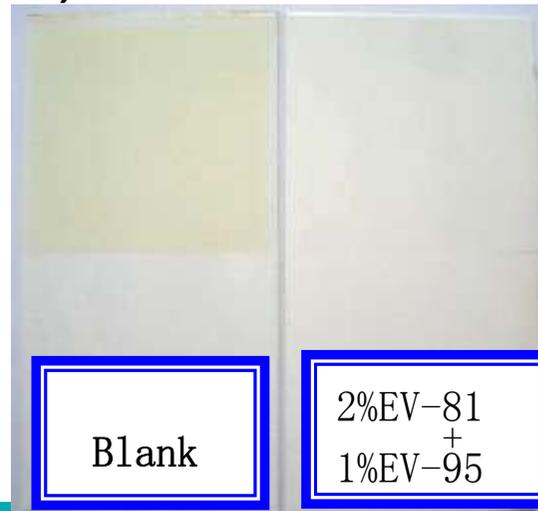
树脂: 透明丙烯酸(AC)/三聚氰胺(melamine) 暴晒时间: 2000小时  
 测试方法: ASTM G154-2(Q-U-V 耐候试验机含 UVB-313 光源)



测试后



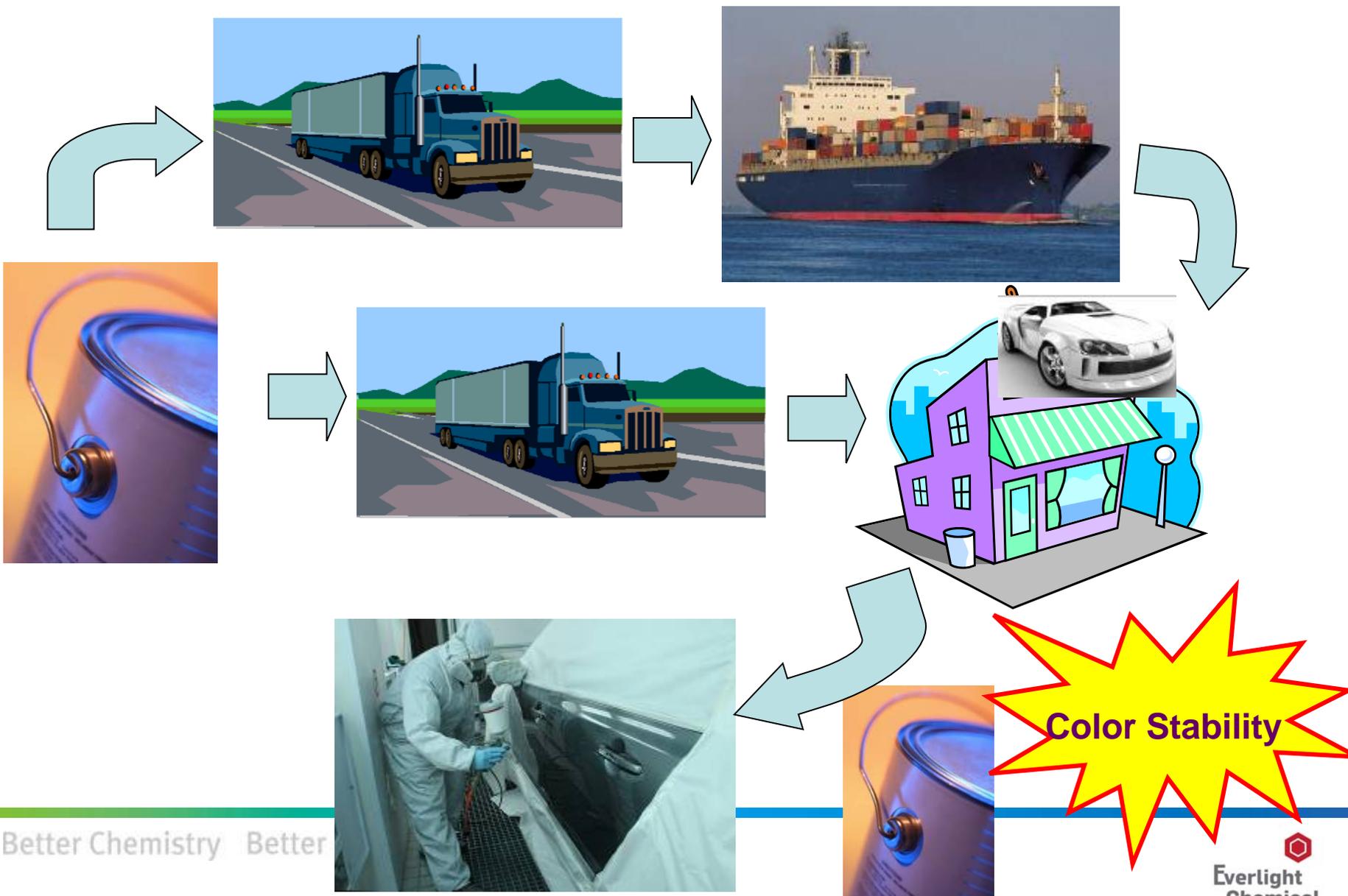
测试前



酸性催化劑體系

# 永光產品差異化與熱穩定性

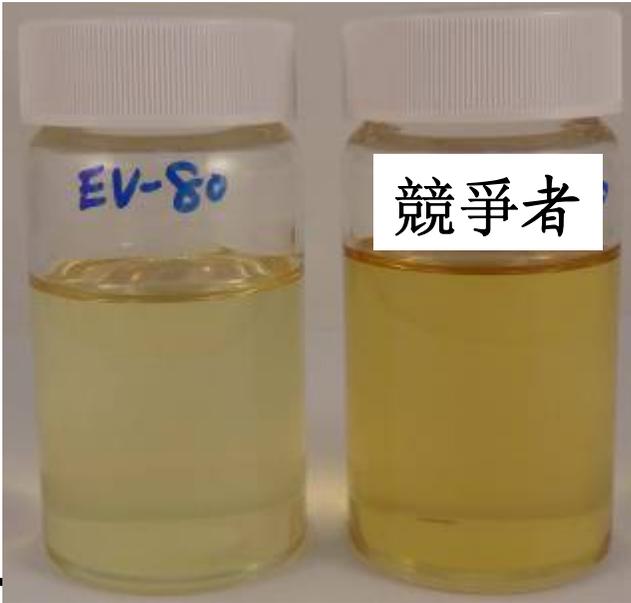
# 產品熱穩定性的重要性



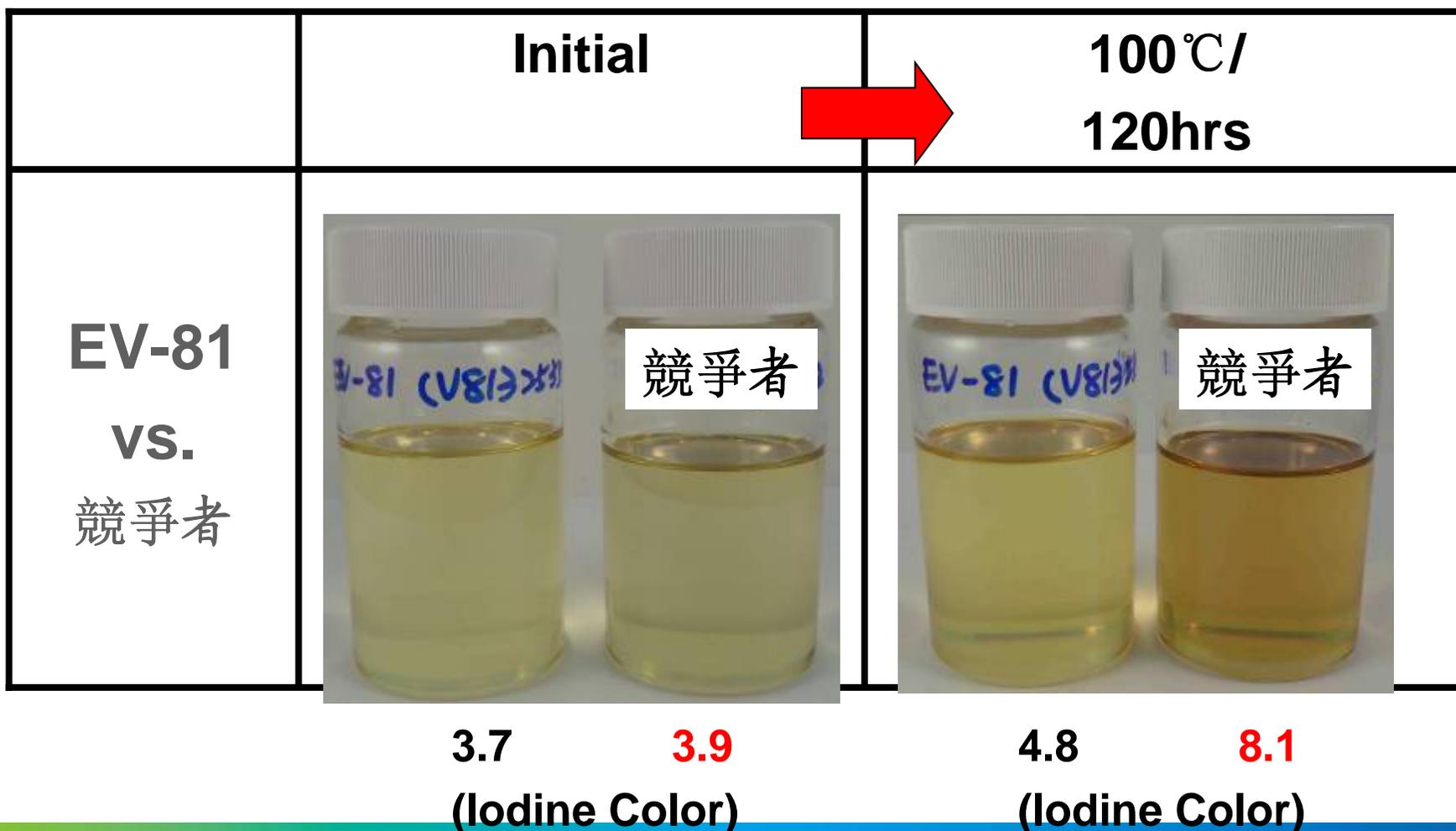
Better Chemistry Better

Everlight  
Chemical

# Eversorb® 80 vs. 競爭者熱穩定性比較

	Initial	100°C/ 120hrs
<b>EV-80 vs. 競爭者</b>	 <p>5.2      6.6 (Iodine Color)</p>	 <p>5.6      11.2 (Iodine Color)</p>

# Eversorb® 81 vs. 競爭者熱穩定性比較



# Eversorb® 95 vs. 競爭者熱穩定性比較

Item NO.	initial	150 ° C/ 30min
EV-95		

8.8 / **25.5**  
(Iodine Color)

Item NO.	initial	150 ° C/ 30min
競爭者		

36 / **94.6**  
(Iodine Color)

# 水性塗料用光穩定劑

# 水性色漆的推荐

透明涂料
底漆涂料（水性色漆）
填充料
电着涂料
车体

车体涂装构成图

透明涂料 + 底漆涂料 = 面漆

永光配方产品：

新型水性涂料用光稳定剂

**Eversorb AQ Series**

添加量：

**0.5 - 3%**

（依据树脂固含量添加）

# 为何紫外线遮蔽中要使用 水性紫外线吸收剂？

紫外线(太阳光)



水性聚合物

← 水性紫外线吸收剂



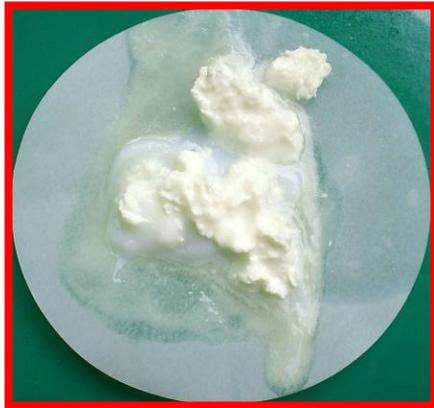
紫外线遮蔽



# 使用光安定剂于水性系统 所遇到障碍

(5g UVA分散在100g 水性压克力树脂  
中)

↓ 过滤



(5g UVA分散在100g水性PU树脂中)

↓ 过滤



一般液态UVA是不容易分散于水性透明树脂中

# EVERSORB® AQ series --

## 新型高性能的水性涂料UV 稳定技术

(5g EVERSORB® AQ1分散在100g  
水性压克力树脂中)

(5g EVERSORB® AQ1分散在100g  
水性PU树脂中)

↓  
过滤



↓  
过滤



Eversorb® AQ1是容易分散于水性透明树脂中

# 永光化学-提供水性涂料用 光稳定剂产品EVERSORB® AQ Series

	化学分类	推荐系统	应用	适用酸硷值范围	产品外观
<b>Eversorb AQ1</b>	完全配方	-非离子 -两性 -阴离子	透明清漆系统	-中性 -偏硷性	
<b>Eversorb AQ2</b>	完全配方	阳离子	透明清漆系统	-中性 -偏硷性	
<b>Eversorb AQ3</b>	紫外线吸收剂为主	-非离子 -两性 -阴离子	透明清漆系统	-中性 -偏酸性 -偏硷性	
<b>Eversorb AQ4</b>	光稳定剂为主	-非离子 -阴离子	色漆系统	-中性 -偏硷性	
<b>Eversorb AQ5</b>	光稳定剂为主	-非离子 -阴离子	色漆系统	-偏酸性	
<b>Eversorb AQ6</b>	紫外线吸收剂为主	-非离子 -阴离子	紫外线遮蔽使用	-中性 -偏酸性 -偏硷性	
<b>Eversorb AQ7</b>	紫外线吸收剂为主	-非离子 -两性 -阴离子	水性光固化系统	-中性 -偏酸性 -偏硷性	

# 提升水性樹脂耐黃變

耐候裝置: Q-U-V 耐候試驗機含 UVB-340 光源

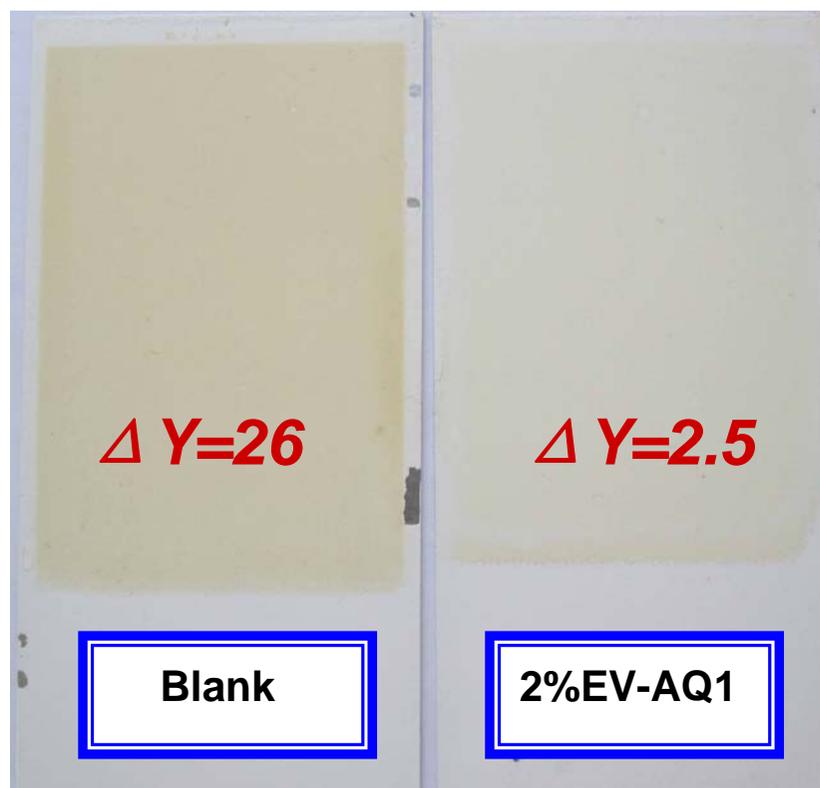
測試方法: ASTM G154-2(8小時光照60 °C, 4小時冷凝50 °C)

照射能量: 0.89W/m<sup>2</sup>

耐候時間: 500小時

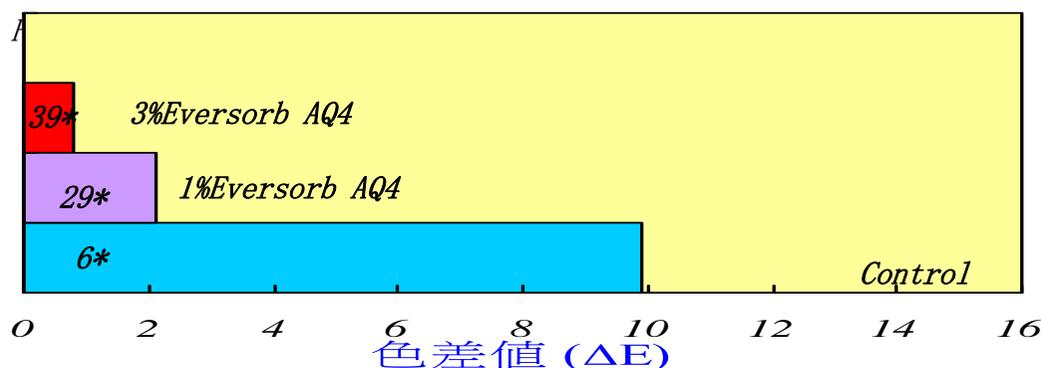
測試後

測試前

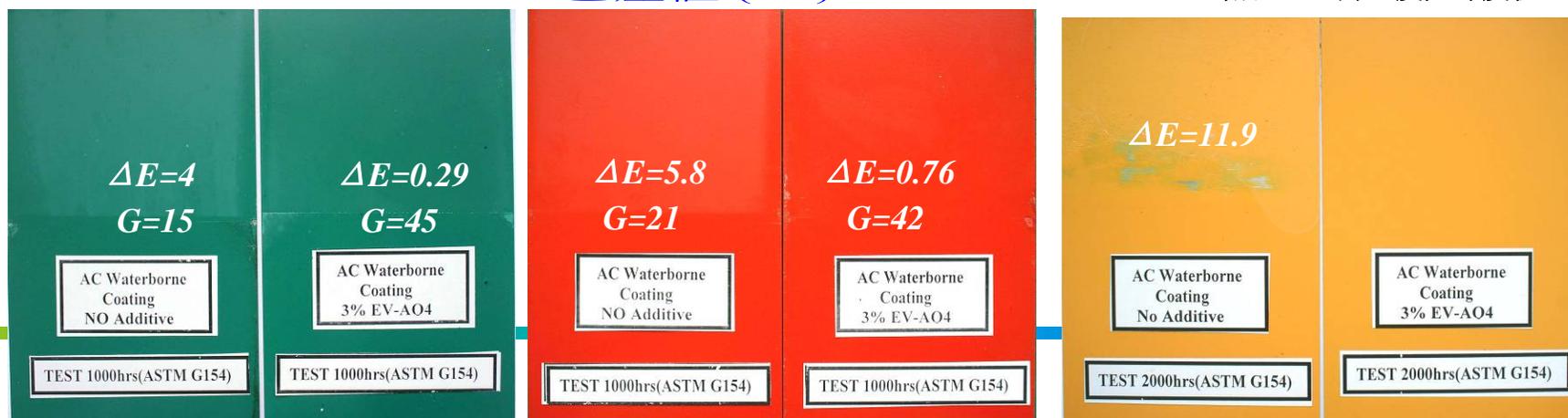


# 提升水性压克力色漆耐黄变及光泽度保留率

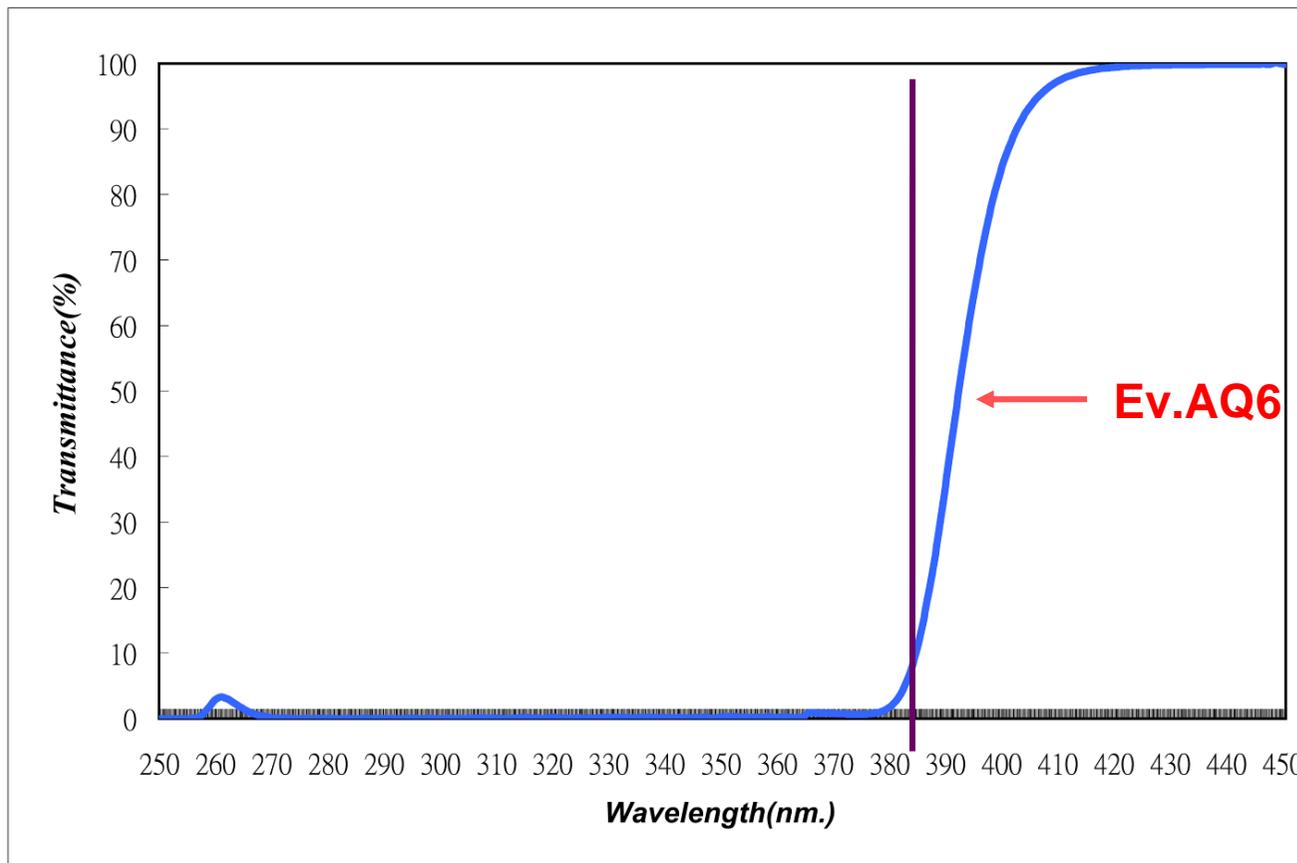
树脂：压克力水性色漆 (AC) 涂料  
 暴晒装置：Q-U-V 耐候试验机含 UVB-313 光源  
 暴晒时间：2000小时  
 添加剂：:EVERSORB AQ4  
 测试方法：ASTM G154-2 (4小时光照60 °C, 4小时冷凝50 °C)



附注：\* 为60度光泽度值



# Eversorb® AQ6 – 高效能水性紫外线吸收剂使用于 紫外线遮蔽



【 500 ppm EVERSORB AQ6 in 1cm cell 】  
【 380nm位置 穿透率: EV AQ6 1.86% 】

# 水性環氧塗料用光穩定劑

# 电着涂料的推荐

透明涂料
底漆涂料
填充料
<b>电着涂料</b>
车体

车体涂装构成图

透明涂料 + 底漆涂料 = 面漆

## 电着涂料

永光配方产品：

新型水性环氧涂料用光稳定剂

**Eversorb EP5**

添加量：

**0.5 - 3%**

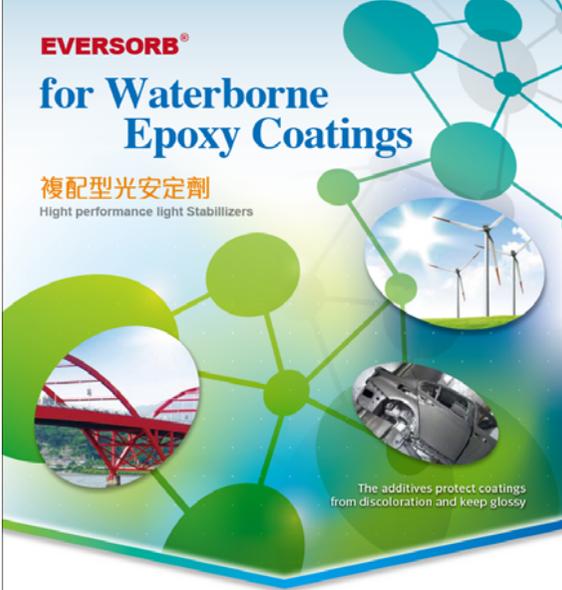
(依据树脂固含量添加)

# 實驗設計(DOE)手法開發新型 水性環氧樹脂用光穩定劑

Better Chemistry  
Better Life

**EVERSORB®**  
for Waterborne  
Epoxy Coatings

複配型光安定劑  
High performance light Stabilizers



The additives protect coatings  
from discoloration and keep glossy

5-Ff., No.77, Sec. 2, Dunhua S. Rd., Taipei 106, Taiwan  
Tel: +886-2-27066000 Fax: +886-2-23263599 Email: sales@eva.com.tw  
www.everlight-eva.com.tw

**Everlight  
Chemical**

利用實驗設計(DOE)中的”篩選設計(Screening Design)”來設計，並配合”反應曲面法(Response surface method)”來做分析，主要目的在找出重要因子(main effect)及部分交互作用(interaction between the factors)之影響。

# 實驗設計-篩選實驗1

表1 不同類型光穩定劑 (EP)

光穩定劑類型(EP)	化學分類
EVERSORB EPA	紫外線吸收劑(UVA)為主
EVERSORB EP5 (EP-5)	水性UVA和HALS複配
EVERSORB EPB	UVA和HALS複配

表2 水性環氧樹脂組成

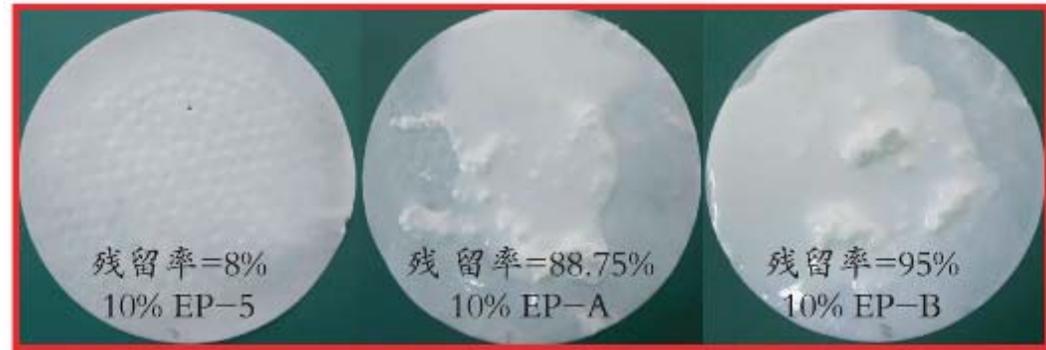
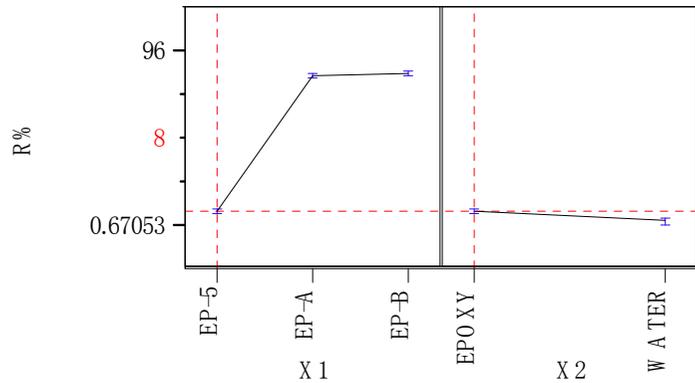
成分	化學分類
POLYPOX E403(DOW)	樹脂
POLYPOX IH7005W(DOW)	硬化劑

表3: 不同類型光穩定劑篩選實驗結果：

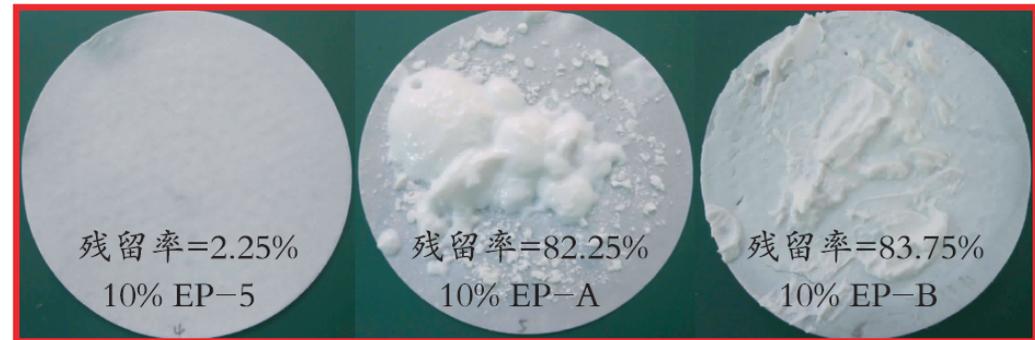
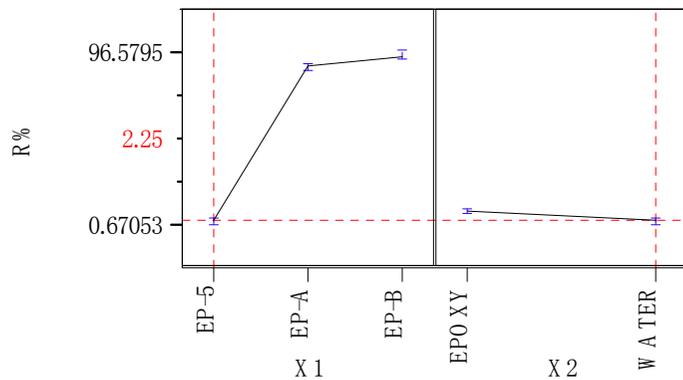
x1：不同類型光穩定劑(10%)	x2：溶液體系	R:殘留率 (%)
EP-A	EPOXY	82.5
EP-5	EPOXY	8.5
EP-B	EPOXY	83
EP-5	WATER	2.5
EP-B	WATER	94
EP-A	WATER	88
EP-A	EPOXY	82
EP-5	EPOXY	7.5
EP-B	EPOXY	84.5
EP-5	WATER	2
EP-B	WATER	96
EP-A	WATER	89.5

# 實驗設計-篩選實驗2

圖一：不同類型光穩定劑於水性環氧塗料分散殘留率比較(主效應圖)



圖二：不同類型光穩定劑於水溶液分散殘留率比較(主效應圖)



# 實驗設計-最適化探討

表4: 最適化實驗探討結果:

Conc.: 水性環氧塗料添加EP-5的比例 (%)	DFT: 水性環氧塗料的膜厚 ( $\mu\text{m}$ )	$\Delta Y$ : 黃變值(110h)
0	20	33.25
0	40	30.88
0.5	20	26.12
0.5	40	27.07
1	40	21.89
3	40	14.5
1	20	20.15
3	20	13.05
0	20	33.05
0	40	30.5
0.5	20	25.92
0.5	40	26.95
1	40	21.72
3	40	14.6
1	20	20.2
3	20	12.92

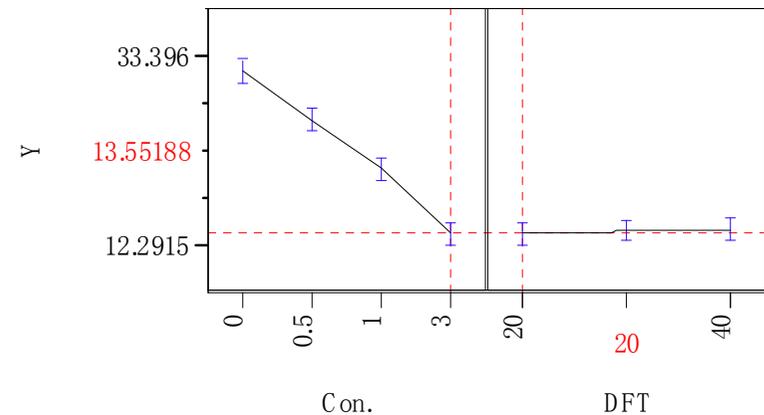
## Parameter Estimates

Term	Estimate	Std Error	tRatio	Prob> t
Intercept	23.298125	0.25609	90.98	<.0001
Con.[0]	8.621875	0.443561	19.44	<.0001
Con.[0.5]	3.216875	0.443561	7.25	<.0001
Con.[1]	-2.308125	0.443561	-5.20	0.0003
DFT (20,40)	0.215625	0.25609	0.84	0.4177

## Scaled Estimates

Nominal factors expanded to all levels

Term	Scaled Estimate	Std Error	tRatio	Prob> t
Intercept	23.298125	0.25609	90.98	<.0001
Con.[0]	8.621875	0.443561	19.44	<.0001
Con.[0.5]	3.216875	0.443561	7.25	<.0001
Con.[1]	-2.308125	0.443561	-5.20	0.0003
Con.[3]	-9.530625	0.443561	-21.49	<.0001
DFT (20,40)	0.215625	0.25609	0.84	0.4177



# Eversorb® EP5 – 提高水性環氧塗料耐黃變

水性環氧樹脂配方：環氧樹脂-A：POLYPOX E 403 (DOW®)

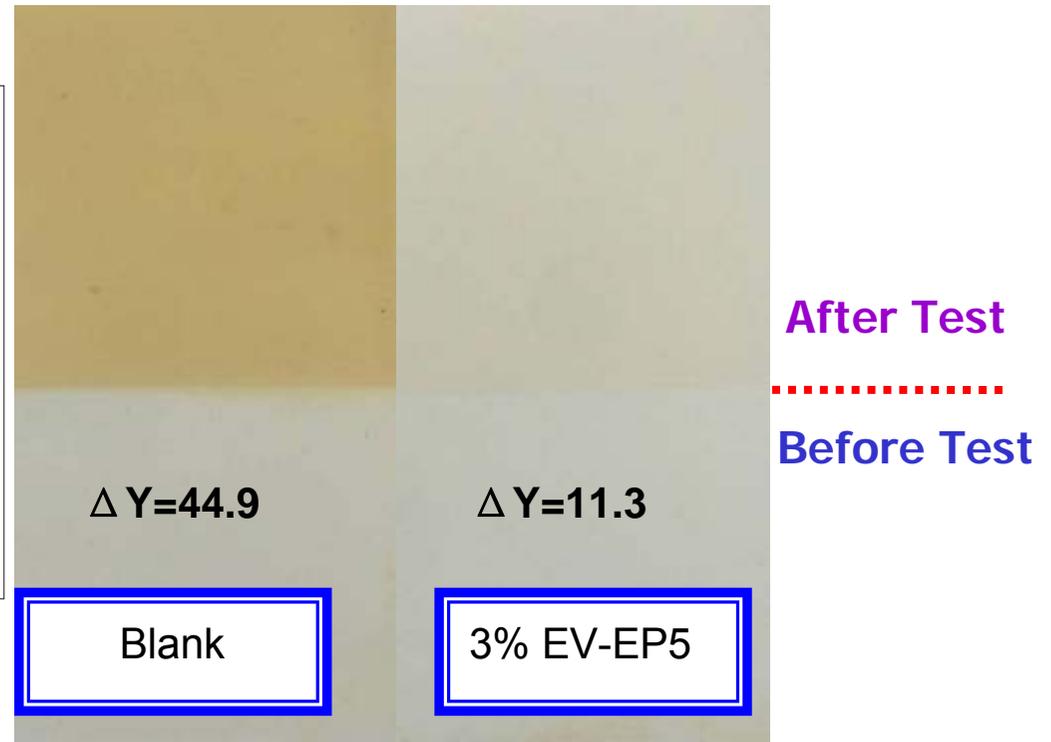
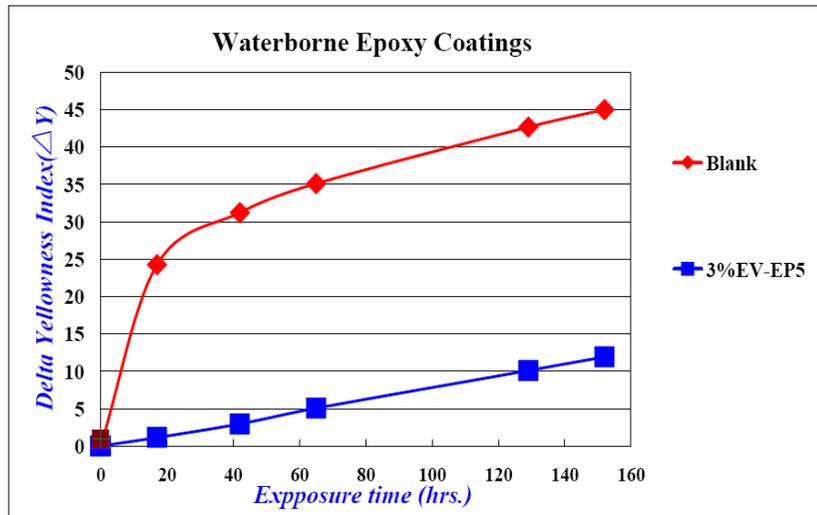
固化劑-B：POLYPOX IH 7005W (DOW®)

A：B重量比=23：21

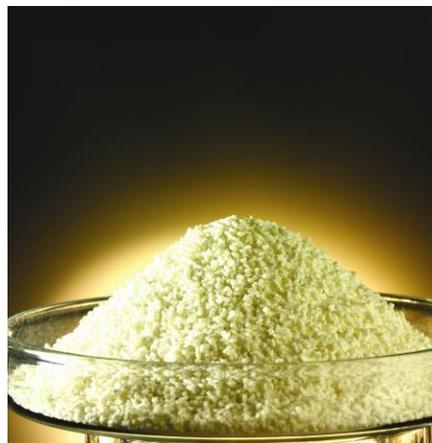
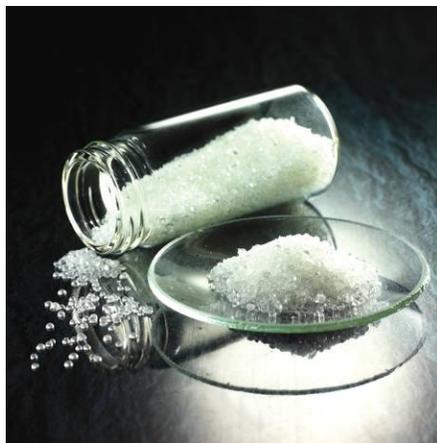
固化條件：室溫固化24hrs

暴曬裝置：Q-U-V 耐候試驗機含 UVB-340( ASTM G154-1)

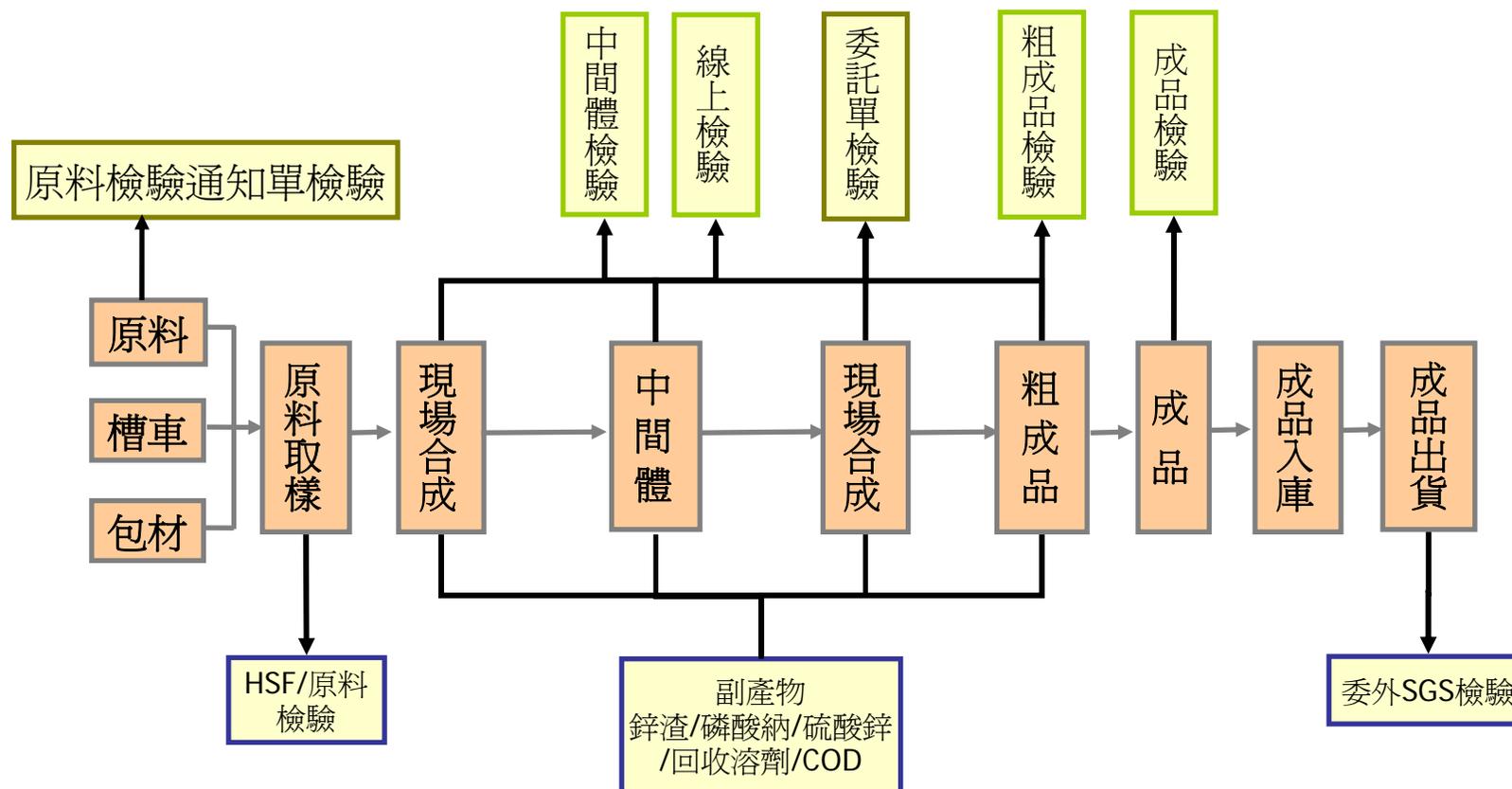
暴曬時間：152小時



# UVA产品品质管理



# 品質控制流程图



# 永光品保留樣室



# 实验室 & 品质验证仪器



Evertight  
Chemical

# 品质验证仪器與耐候试验机



**LC/MS**



**GC/MS**



**NMR**



**AA**



**QUV weathering tester**



**Xenon Weathering Machine**



**Particle Size Analyzer**



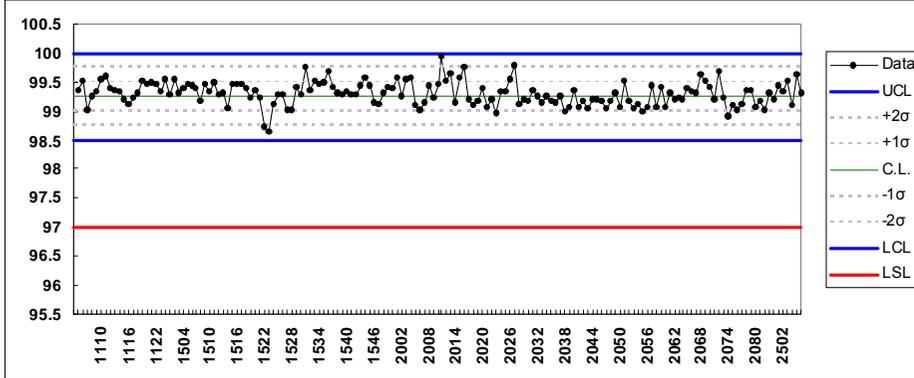
**ICP/MS**

# Eversorb® 品质控管水平

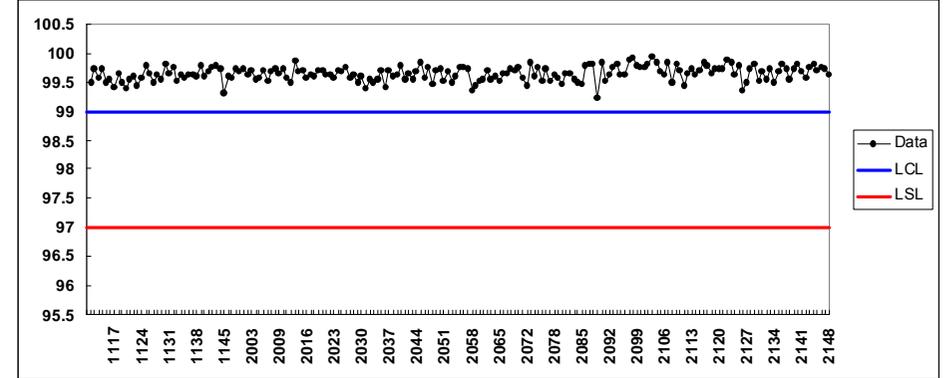
2011~2012

LSL: Lower specific Limit ; UCL: Upper Control Limit ; LCL Lower Control Limit

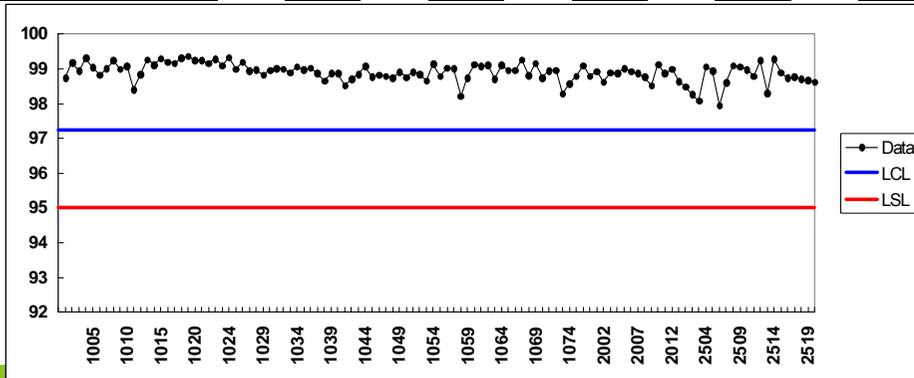
<b>Eversorb 80</b>	X Bar	<b>99.30</b>	UCLx	<b>100.00</b>	USLx		Cpu		Cpk	<b>3.82</b>
<b>T% @ 500nm</b>	STDEV	<b>0.20</b>	LCLx	<b>98.50</b>	LSLx	<b>97.00</b>	Cpl	<b>3.82</b>	Cp	



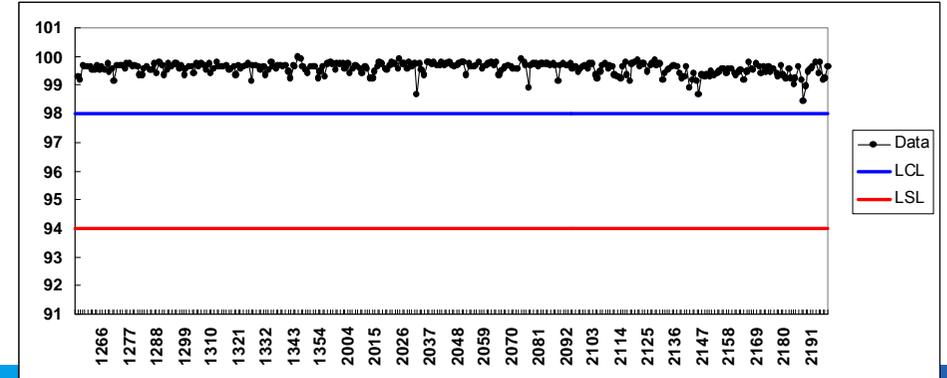
<b>Eversorb 93</b>	X Bar	<b>99.65</b>	UCLx		USLx		Cpu		Cpk	<b>7.01</b>
<b>T% @ 450nm</b>	STDEV	<b>0.13</b>	LCLx	<b>99.00</b>	LSLx	<b>97.00</b>	Cpl	<b>7.01</b>	Cp	



<b>Eversorb 81</b>	X Bar	<b>98.91</b>	UCLx		USLx		Cpu		Cpk	<b>4.82</b>
<b>T% @ 460nm</b>	STDEV	<b>0.27</b>	LCLx	<b>97.26</b>	LSLx	<b>95.00</b>	Cpl	<b>4.82</b>	Cp	



<b>Eversorb 74</b>	X Bar	<b>99.58</b>	UCLx		USLx		Cpu		Cpk	<b>8.76</b>
<b>T% @ 460nm</b>	STDEV	<b>0.21</b>	LCLx	<b>98.00</b>	LSLx	<b>94.00</b>	Cpl	<b>8.76</b>	Cp	

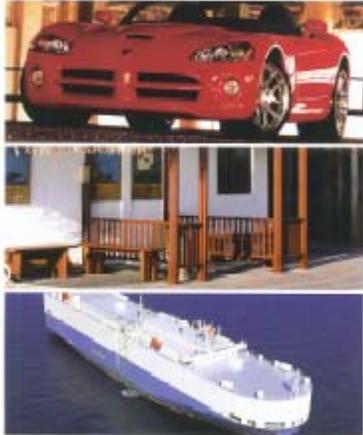


Better Chemistry Better Life

# 解決塗料黃變的方案

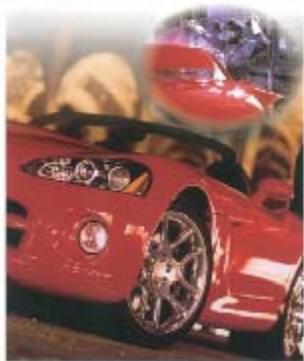
## Eversorb® 83, 84&85

高配型光安定劑  
High Performance Light Stabilizer



## Eversorb® 81 & 93

Light Stabilizers for Automotive Coatings  
汽車塗料專用光安定劑

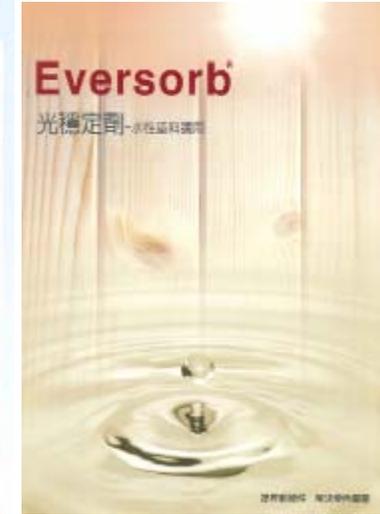


better Chemistry

## APPLICATION

● : Recommended  
○ : Can be used  
P : Powder  
L : Liquid

		OEM Coatings				Re-finish Coatings		Wood Coatings			Wood Pre-treatment	Wood Stain	Powder Coatings		Waterborne Coatings			UV Curable Coatings	Floor Coatings		
		Acrylic Resin	PU Resin	Halogens Resin	Melamine Resin	Alkyd Resin	PU Resin	NC Lacquer	PU Resin	Amino Resin		Acrylic Resin	Alkyd Resin	Polyester Resin	Acrylic Resin	PU Resin	Acrylic Resin	UV Curable Resin	Epoxy Resin	Acrylic Resin	Epoxy Resin
Eversorb 74	P	○	○	○	○	○	○	●	●	●	●										
Eversorb 76	P	●	○	○	○	○	○	○	○	○	○		●	●							
Eversorb 80/80C	L	○	●	○	○	●	●	●	●	○											
Eversorb 81/82	L	●	○	●	●	○	○	○	○	○	●										
Eversorb 83	L	○	●	○	○			●	●	○											
Eversorb 84	L	●	○	●	○			○	○	○	●										
Eversorb 85	L	○	○	○	●	●	○	●	○	○											
Eversorb 89	P	●	●	○	●	●	○	○	○	○		●	●								
Eversorb 93/93C	L	●	●	●	○		●	●	●	●											
Eversorb 95	L	○	○	○	●	●	○	●	○												
Eversorb 60	P											●	●								
Eversorb AC5015	L															●	●	●			
Eversorb SB1	L										●										
Eversorb WS1	L										●										
Eversorb EP5015	L																		●		
Eversorb EP4	L																				●
Eversorb EP5	L																		●		



## Eversorb® Light Stabilizer

for Pressure Sensitive Adhesive  
Optically Clear Adhesive

Evertight Chemical



Your Reliable Green Energy Partner

Evertight Chemical

# 結論

為了減少塗膜劣化產生，使用紫外線吸收劑(UVA)和胺光穩定劑(HALS)是必需的。

永光化學提供一系列塗料用光穩定劑- **Eversorb®** 能够提高塗料產品耐候價值。

永光化學是專業的光安定劑製造商，可以提供完整配方與服務，從光安定劑樣品的篩選、最適化配方的設計到試片的耐候測試，希望能透過雙方協同合作，期待共創雙贏的局面。

# 感謝

感謝 6 $\delta$  統計分析小組  
黃世承(Shin-Chen Huang)

感謝 塗料小組  
宋宇書(Yu-Shu Sung)

感謝 永光技術顧問  
張家虎(Chia-Hu Chang)博士

感謝 我的長官  
黃耀興 (Yao-Hsing Huang) 處長  
在塗料光穩定劑研究的指導  
及  
特化事業處負責人  
蔡光豐 (Robert Tsai) 副總經理  
的支持及鼓勵。

# 永光合作伙伴



Jotun Paints



valspar paint®



 **BASF**  
The Chemical Company



**HEMPEL**

# 技術行銷活動介紹



# 技術文章發表於國際期刊 (日本)

## Applications of Light Stabilizers on the Optical Films for Liquid Crystal Display

[台湾 Everlight Chemical Industrial Corp.]

### 光電子デバイス用素材における光安定剤の効果 光安定剤「Eversorb<sup>®</sup>」の効果を実験で確認

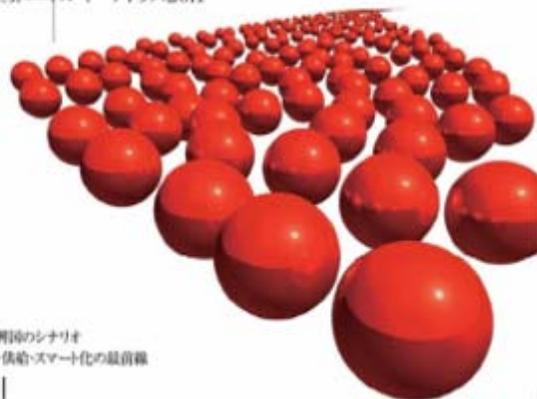
NIKKEI ENERGY

日経エネルギー

新時代のビジネス社会をつくる

WORLD ENERGY ATLAS

特集:世界エネルギーアトラス2011



ポリマーベースした樹脂材料が使われていることが多く、UVに劣化や黄変、変色などの劣化が生じる恐れがある。こうした劣化を抑える技術の開発は、製品寿命を高めるための適切な光安定剤の選び方について述

が材料の品質を劣化させないという問題を招く。これは高熱、紫外で劣化、どうしても紫外線に劣化する。しかし、劣化を抑制することによって安定性を向上させる。これによって光電子デバイスが可能になる。

劣化が抑制される。このように劣化を抑える。劣化を抑制することによって安定性を向上させる。これによって光電子デバイスが可能になる。

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た後、分光光度計でそれぞれの劣化を測定した。その結果、紫外線照射後、光安定剤を添加した試料はΔb\*値とΔYI値が小さくなった。一方、Eversorb<sup>®</sup>を添加した試料はΔb\*値とΔYI値は0.2を下回り、劣化が抑制された。この実験結果は、光安定剤がデバイスの劣化を大幅に抑制することができることを示している。

同様に、厚さ2.0mmのPC (ポリカーボネート) についても、光安定剤を添加した試料は劣化が抑制された。また、劣化を抑制することによって安定性を向上させる。これによって光電子デバイスが可能になる。

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In the optoelectronic industry, ranging from the most prevailing LCD industry to the back plate for the emerging touch panel, solar cell industries. The optical-grade PET film has the advantages of light weight, thinness, durability and non-conductivity. Usually used as the support film for other optical thin films such as AG, PVA, etc., and can serve as the protection film against scratches for other films.

The yellowing mechanism of PET is: the aromatic polyester (A) is photo-oxidized to produce the oxide as shown in (B) in which the hydrogen peroxide group is located at the hydroxyl radical. As the photolysis of hydrogen peroxide and the oxygen abstraction reaction of the alkoxy radicals to produce the alkoxy radicals, the final products become hydroxy and aldehyde groups (Fig. 1(C) and (D)). The yellowing of PET is mainly due to the production of these fluorescent materials (C) and (D). According to the photolysis mechanism of PET, it can be concluded that the UV light and polymer radicals (or the peroxide groups) are the main factors for the yellowing of the material. Therefore, it is necessary to add light stabilizers into the PET film to slow down the decomposition or yellowing. In recent years, the requirements of the optical-grade PET films have been much higher. Thus, the approach to select a proper mixture formula is the key for determining the film quality.

Applications of Eversorb OP on the Optical-Grade PET Films. The PET film added with Eversorb OP has a better UV-CUT property. In different doses of Eversorb OP in the PET film, the transmittance at 380 nm will be below 10% (Table 1).

YI	YI	Transmittance %
380 nm PET Film	380nm	(λ=380nm)
nil	0.96	63.92
Eversorb OP	1.18	9.98
4 Eversorb OP	2.95-3.67	0.47-1.73

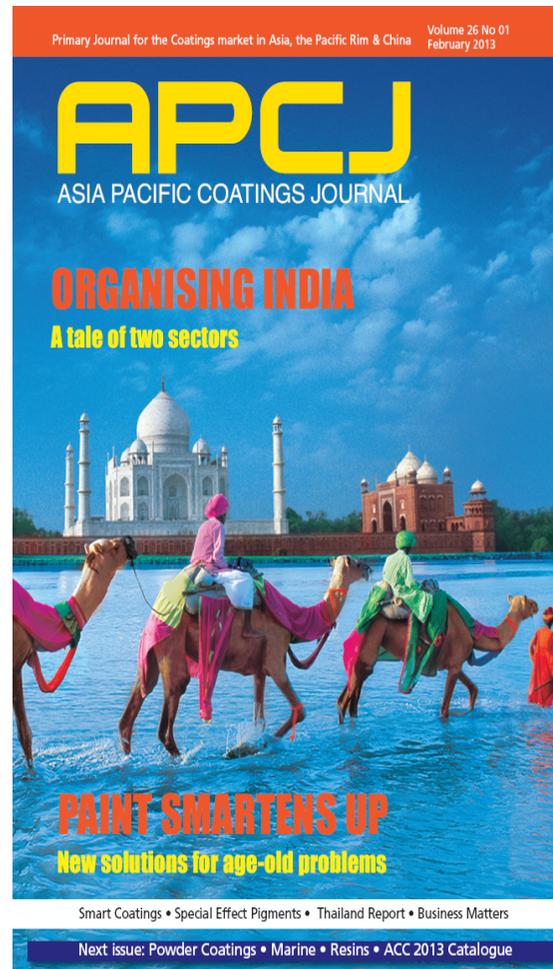
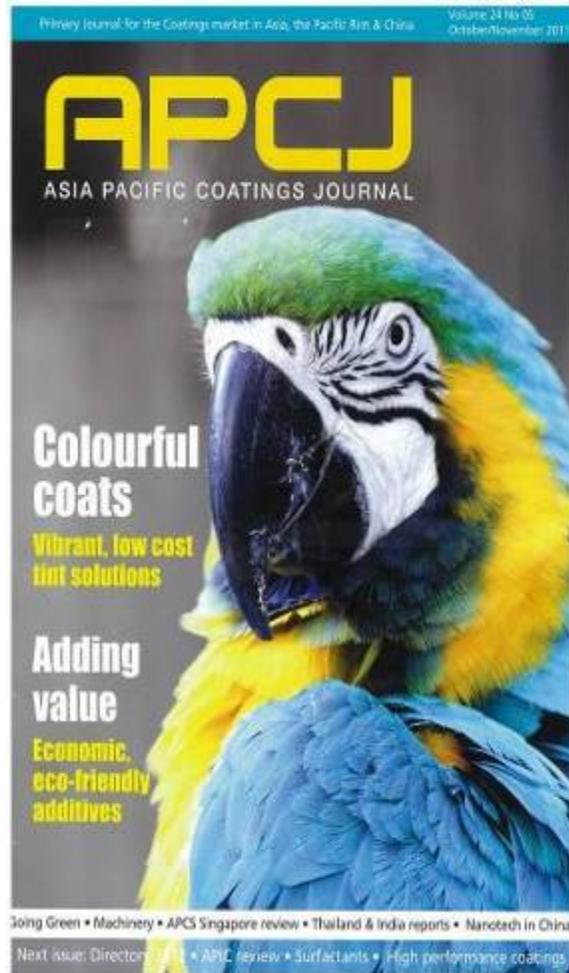
YI = Yellowing Index

識者が読み解く新興国のシナリオ  
激変する電力利用-供給-スマート化の最新情報

2011 SPRING

Better Chemistry Better Life

# 技術文章發表於國際期刊（亞太）



APCJ總編 Christine

# 技術文章發表於國際期刊（美國）

Light Stabilizers FEATURE



by Yung-Chi Yang, Steven Lee  
and Dr. Yao-Hsing Huang,  
*Everlight Chemical Industrial Corporation*

**H**igh solids, powder, waterborne and UV curable coatings—the “green” coatings—have been developed to replace conventional high VOC and solvent-based coatings. Although the latest technology has overcome the disadvantages of traditional solvent-based coatings, light stabilizers in green coatings still play an important role helping to avoid degradation from sun light exposure and improve weathering stability. Everlight has developed several products specifically for green coatings.

#### Green coatings and light stabilizers

Green coatings can be as diversified as high-solids, powder, waterborne and UV curable coatings and so on. They are designed to eliminate the release of VOCs from conventional solvent-based coatings.

The cause of coating degradation such as discoloration, delamination, loss of gloss, cracking and chalking is due to the chromophores, or impurity content, found in the material triggered by UV light, which is damaging. Therefore, UV absorbers and light stabilizers are both recommended in order to prevent coating decomposition.

Light stabilizers can be divided into two groups: UV absorbers (UVA) and the hinder amine light stabilizers (HALS). UVA's function is to absorb UV light and transform it into heat; HALS is best known to capture free radicals and prevent material degradation.

#### Light stabilizers recommended for green coatings

##### 1. High-Solids Coatings

The objective with high-solids coatings is to reduce the requirement of organic solvents and increase solids content. Most coating systems need to use acidic catalysts to improve film hardness during thermo-curing processes.

April 2012

[www.coatingsworld.com](http://www.coatingsworld.com)

Coatings World | 83



Coating World總編Tim



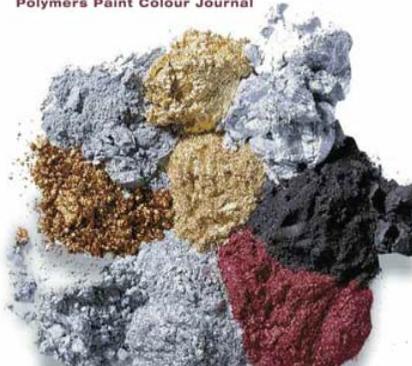
# 技術文章發表於國際期刊 (歐洲)

Leading Journal for the Coatings Industry in Europe and the Middle East

Vol 203 No 4583  
April 2013

UV Curing

**PPCJ**  
Polymers Paint Colour Journal



**Brilliant effects with improved sustainability**

UV/EB Curing • Wood Coatings • Special Effect Pigments • Smart Coatings • ECS Review

Yang Yung-Chi, Sung Yu-Shu, Chiu Hsiao-Fang, Chen Chih-Hsien and Dr Huang Yao-Hsiung, Everlight, discuss the effects of the use of light stabilisers in waterborne clear UV-curable model formulation

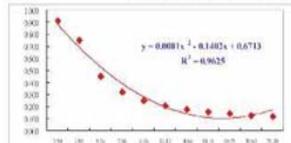
## Novel light stabilisers for waterborne UV-curable coatings

UV curable processes have been used extensively in many different industries such as packaging, printing and production of coatings. The most advanced and important among them is the UV curing of coatings. UV curing is a fast and efficient process. However, most polymers are susceptible to degradation by UV and visible light. It requires light stabilisers to enhance the durability of coatings. Light stabilisers, therefore, they can be divided into two groups: UV absorbers (UVA) and the hindered amine light stabilisers (HALS). UVA functions in absorbing UV light and transforming into heat and the HALS is best known for capturing free radicals to prevent material degradation.

It is important to know UV curable coatings especially in a dry later system. Photoinitiator absorbs UV energy to initiate the curing process. UV absorber absorbs UV energy to prevent coatings damage. As a result, UV absorber and photoinitiator are competing for UV energy to cause negative impacts on cure speed. The novel light stabiliser can solve this problem.

UV curable is a well-accepted technology. However, UV curable coatings have colour, emission monomers and VOC emissions.

UV curable coatings were made with various and different (MWB) or coated (Laser) and were cured under 100W/cm high pressure Hg lamp. Cure speed was recorded across the coating left no visible marks after a finger nail scratched across the coated surface a few times. Figure 1 illustrates UV energy (J/cm<sup>2</sup>) delivered to the coating surface as a function of conveyor belt length (m). It is evident that the coating receives a lower amount of UV energy at higher belt speed. The resulting dry film thickness (DFT) was either 15µm or 20µm depending on the size of MWB doses.



**Table 1. Classification of light stabilisers**

Ingredients	Supplier
Everlight A (UVA)	Everlight Chemicals
Everlight AQ7	Everlight Chemicals
Everlight B (HALS)	Everlight Chemicals

**Table 2. Compositions of waterborne UV curable model formulation**

Ingredients	Supplier
Everlight A (UVA)	Everlight Chemicals
Everlight AQ7	Everlight Chemicals
Everlight B (HALS)	Everlight Chemicals

Waterborne UVA, HALS and film thickness – inhibit some degrees of influence to the cure speed.

**Table 3. Details of screening design and test results**

Run	Pattern	EVA	EAQ7	EVB	DFT	The min. energy to reach cure speed (J/cm <sup>2</sup> )
1	---	1%	0	15	0.123	0.123
2	---	0	1%	15	0.123	0.123
3	---	0	0	1%	15	0.123
4	---	1%	0	1%	15	0.123
5	---	0	1%	0	15	0.123
6	---	1%	0	0	15	0.123
7	---	0	0	1%	15	0.123
8	---	1%	0	0	15	0.123
9	---	0	1%	0	15	0.123
10	---	0	0	1%	30	0.246
11	---	1%	0	1%	30	0.246
12	---	0	1%	1%	30	0.246
13	---	1%	0	1%	30	0.246
14	---	0	0	1%	30	0.246
15	---	1%	1%	1%	30	0.246
16	---	0	1%	0	30	0.246

**The experimental data analysis results from Table 3: R<sup>2</sup>=0.99, Radj<sup>2</sup>=0.97, RMSE=0.008**

Parameter	Estimate	Std Error	t-Stats	Prob> t
Intercept	0.192728	0.004315	44.46	<0.0001
EVA	0.027517	0.004315	6.40	0.0013
EAQ7	0.027517	0.004315	6.40	0.0013
EVB	0.027517	0.004315	6.40	0.0013
DFT	0.001929	0.000131	14.34	<0.0001
EVA * DFT	0.001929	0.000131	14.34	<0.0001
EAQ7 * DFT	0.001929	0.000131	14.34	<0.0001
EVB * DFT	0.001929	0.000131	14.34	<0.0001

**Effect Tests**

Source	DF	Sum of Squares	F-Stats	Prob>F
EVA	1	0.0004425	42.1288	0.0013
EAQ7	1	0.0004425	42.1288	0.0013
EVB	1	0.0004425	42.1288	0.0013
DFT	1	0.0000000	0.0000	1.0000
EVA * DFT	1	0.0004425	42.1288	0.0013
EAQ7 * DFT	1	0.0004425	42.1288	0.0013
EVB * DFT	1	0.0004425	42.1288	0.0013

**Table 4. The effect of curing energy with waterborne UV curable model formulation**

Parameter	Estimate	Std Error	t-Stats	Prob> t
Intercept	0.003540	0.000084	41.98	<0.0001
EVA	0.000480	0.000084	5.71	0.0001
EAQ7	0.000480	0.000084	5.71	0.0001
EVB	0.000480	0.000084	5.71	0.0001
DFT	0.000000	0.000084	0.00	1.0000
EVA * DFT	0.000480	0.000084	5.71	0.0001
EAQ7 * DFT	0.000480	0.000084	5.71	0.0001
EVB * DFT	0.000480	0.000084	5.71	0.0001

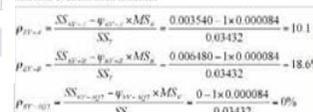


Fig. 2. Everlight AQ7 with water based UV curable coatings for plastic coating. Results show Everlight AQ7 would have no negative impacts on cure speed.

1 PPCJ – April 2013 www.coatingsgroup.com

UV Curing

The Curing Energy (J/cm<sup>2</sup>) = 0.0639 + 0.0736 (EVA) + 0.0914 (EAQ7) + 0.0915 (EVB) + 0.0017 (DFT) + 0.0004 (EVA \* DFT) + 0.0004 (EAQ7 \* DFT) + 0.0004 (EVB \* DFT) + 0.0004 (DFT<sup>2</sup>)

**Effects of waterborne UV Absorber**

Photoinitiator absorbs UV energy to initiate curing process. UV absorber absorbs UV energy to prevent coatings damage. As a result, UV absorber and photoinitiator are competing for UV energy to cause negative impacts on cure speed. This was exactly what was observed in the study. Model derived from data confirms waterborne UV absorber is a significant factor that causes cure speed to drop considerably. For EVA, the effect of curing energy was about 10.1% (see Table 4).

**Effects of waterborne HALS**

Although HALS do not exhibit any appreciable amount of UV absorption compared to UV absorbers, to Everlight's surprise, they exhibit the highest negative effects on curing energy among all factors (see eq. 1). One possible explanation is the fact that HALS are an effective free radical scavenger. The HALS molecule can regenerate to begin another termination process. As a result, for EVA, the effect of curing energy was about 18.6% (see Table 4) and it is higher than UV absorbers.

**Effects of film thickness**

Film thickness is the less significant factor in this study (see eq. 1). Its negative coefficient is in agreement with a known fact to the industry – in a free radical polymerization mechanism, oxygen inhibition affects thicker film more than thicker film. Moreover, a positive constant, 0.0025, in the model indicates oxygen inhibition did occur to the coatings.

**Effects of the waterborne UV curable light stabiliser**

Everlight AQ7 is developed specifically for waterborne UV curable coatings. Test data showed that Everlight AQ7 in a waterborne clear UV curable coating would not have negative impacts on cure speed. For EAQ7, the effect of curing energy was about 18% (see Table 4).

**MINIMAL ENERGY TO REACH CURING TESTS**

When increasing dosage of Everlight AQ7 in the waterborne UV curable system, the result shows that Everlight AQ7 would have no negative impact on cure speed (as shown in Figure 2).

**WEATHERING TEST**

Everlight AQ7, with a waterborne UV curable coating for plastic coating, after 120hrs QUV-300uv exposure (figures 3 and 4).



Fig. 3. Everlight AQ7 with water based UV curable coatings for plastic coating. Results show Everlight AQ7 would have no negative impacts on cure speed.

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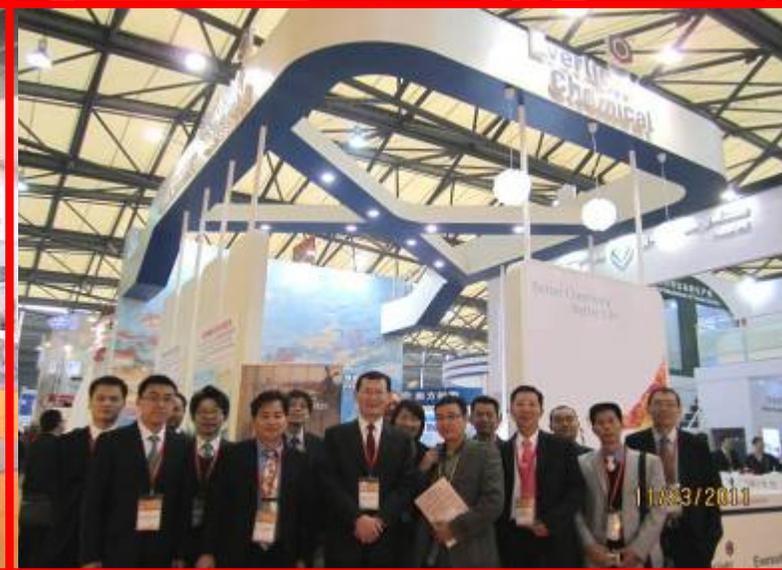


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PPCJ總編Sue

# 2004~2012中國塗料展



# 2012第十七屆中國國際塗料展技術講座發表

CHINACOAT2011

- 首頁
- 展會簡介
- 日期及地點
- 觀眾預先登記
- 學術會議
- 技術培訓班
- 新技術天地
- 技術講座**
- 11月23日
  - M13-1M20-1M21-1M22-1M25-1
  - M13-2M20-2M21-2M22-2M25-2
  - M13-3M20-3M21-3M22-3M25-3
- 11月24日
  - M13-4M20-4M21-4M22-4M25-4
  - M13-5M20-5M21-5M22-5M25-5
  - M13-6M20-6M21-6M22-6
  - M20-7M21-7M22-7M25-7
  - M20-8M21-8M22-8M25-8
  - M20-9M21-9M22-9M25-9
- 國際塗料業年會
- 大會贊助商最新信息



## 行業超級展會



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EVERSORB AQ1是台灣永光化學公司針對水性透明清漆所發... 防止劣化的發生... 擴實驗室加速耐候... 好。另軟木的木質... 必)經SB-1木質素...

...處技術課長，他專... (ole)光穩定劑應用... Series和光固化...



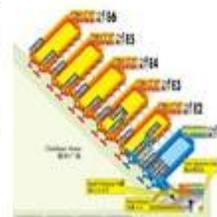
講座編號 M22-7



楊永吉先生

...是針對木器預處... 劑噴塗在不同木... 沒有預處理好，且... 獲得較顯著的保... 處理後有更顯著...

...入永光化學工業... 日益重視，目前...



# 2010~2012亞太塗料展技術講座發表

**APCJ Show Daily**  
ASIA PACIFIC COATINGS JOURNAL

Day 2, September 20, 2012 Asia Pacific Coatings Show 2012

## Good to be back in Jakarta

Yesterday the APCJ Show Daily Coatings Show returned to Jakarta after a hiatus of two years. The show is back in Jakarta, Indonesia, and the APCJ Show Daily Coatings Show is back in Jakarta, Indonesia.

The show was organized by Troy Sankala, Director of Specialty Chemicals, Global Technical Industry for the coatings division of Rohm and Haas. The show is back in Jakarta, Indonesia, and the APCJ Show Daily Coatings Show is back in Jakarta, Indonesia.



Today's papers include a look at 'green' polysiloxane wetting additives from Troy (Thailand); novel light stabilisers for waterborne epoxy coatings from Everlight (Taiwan); infrared reflecting pigments from Ferro (Indonesia) and the risks of VOCs in decorative paints from ExxonMobil (Singapore).

**11:40 - 12:05**  
**The Novel Light Stabilizers for Waterborne Epoxy Coatings**  
**Yung-Chi Yang, Everlight Chemical Industrial Corporation, Taiwan**

Epoxy materials are used frequently in industrial coatings. Despite the advantages of these properties there is one major drawback with using epoxy materials. Discoloration may occur over a relatively short period of time when epoxies are exposed to Ultra Violet (UV) light radiation from indoor lightening, or natural sunlight. The clear coat containing UV absorbers and light stabilizers is commonly applied to the surface for protection. Eversorb® EP4, a blend of UV absorber and HALS, is developed specifically for solvent borne epoxy coatings. Waterborne epoxy coatings - the green coatings - have been developed to replace conventional high VOC and solvent-based coatings. It has overcome the disadvantages of traditional solvent-based coatings. Eversorb® EP5, a blend of UV absorber and HALS, is developed specifically for water borne epoxy coats. This paper is a comparison study of three different light stabilizers to disperse in water and waterborne epoxy coating. Design of Experiment (DOE) was used in this study. Our data confirmed that by increasing the concentration of Eversorb® EP5 in the top coat can effectively protect from UV light degradation. Furthermore, data also showed that by increasing the coating thickness, but not as effective as adding light stabilizers in the coating.

IN ASSOCIATION WITH THE COATING RESEARCH INSTITUTE GROUP





**ASIA PACIFIC COATINGS SHOW 2012 CONFERENCE**  
19 & 20 SEPTEMBER 2012  
ROOM: NURI ROOM  
BALAI SIDANG JAKARTA CONVENTION CENTER, INDONESIA

**ADVANCES IN ORGANIC COATINGS, RAW MATERIALS AND TESTING EQUIPMENT**

**CONFERENCE OPENING TIMES**

<b>WEDNESDAY, 19 SEPTEMBER 2012</b> 13:00 - 17:35	<b>THURSDAY, 20 SEPTEMBER 2012</b> 10:00 - 15:30
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REGISTRATION: 12:00 - 12:45

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# 台灣：工研院邀請演講

## 高值化 UV 塗料應用商機研討會

塗料相關產品因可賦予基材防火、防污、防蝕、防潮、耐酸鹼、隔熱與絕緣等機能而廣泛被應用在建築、美術、交通工具、機械、家具、金屬與電子等產品。隨著生活水平提升，以及人們愈來愈重視環保的訴求下，綠色環保塗料深具市場潛力。於 2010 年 UV 塗料更占全球塗料二分之一產量，隨著顯示器等產業逐年提昇其產量。

工研院材化所有鑒於此一發展趨勢，為促進塗料相關產業之升級與轉型，特於 101 年 3 月 2 日舉辦高值化 UV 塗料應用商機研討會，分別邀請在國內企業界及學術界極具知名的技術應用廠家，提供塗料相關產業在上中下游產品之開發、研究及投資等方向的參考，期望藉了解下游的發展而促動上游的商機，歡迎塗料相關產業同業先進踴躍報名參加。欲洽談雙方合作及研討會展覽攤位等事宜歡迎聯繫本單位。

◆ 主辦單位：財團法人工業技術研究院材料與化工研究所

◆ 協辦單位：台灣塗料與塗裝科技發展協會

◆ 時間：101 年 03 月 02 日（星期五）上午 08:30 - 16:30

地點：新竹市大學路 1001 號 交通大學 電子資訊研究大樓

◆ 內容與時程：

時間	內容	主講(持)人
8:30-9:00	報到、領取資料	
9:00-9:10	致詞	材化所長官暨協辦單位
9:10-10:10	疏醇對於紫外光固化的應用	鄭揚敏先生 恆橋產業股份有限公司 研究員
10:10-10:30	休息時間	
10:30-11:30	光穩定劑在UV光固化製程技術領域的應用探討	楊永吉 先生 台灣永光化學工業股份有限公司 技術副理
11:30-13:30	午餐時間	
13:30-14:30	木器家具之UV塗料應用	郭威志 先生. 台灣大寶塗料有限公司 技術部副理
14:30-15:00	休息時間	
15:00-16:00	紫外光固化在光學膜之應用	張淑美 女士 國立台北科技大學 分子科學與工程系 有機高分子研究所 教授
16:00-16:30	綜合討論 Q&A	工研院 鍾明樺主任 陳守一經理



# 台灣：塑膠中心邀請演講

主辦單位：經濟部工業局 協辦單位：財團法人塑膠工業技術發展中心  
敬請轉交相關人員，謝謝！

## 『從感壓膠技術看應用發展趨勢』

- 配方、材料、製程及應用要點

### ※研討會概要

感壓膠 (PSA) 是一種粘著劑，是為了具永久黏著力或可移動的應用而設計的，當壓力被施加到黏附的粘著劑上時，能短時間內，即可達成良好接著效果的接著劑，能像液體一樣快速濕潤表面，但撥離時又能如同固體般的離開被覆物。

感壓膠除了膠體本身，同時還會有基材做為讓黏著劑附著的材質，藉由對不同表面的黏著力和膠體本身內聚力的作用互相平衡，而因感壓膠具備了不須塗佈或混合等預處理步驟，使用時膠量均勻、使用上方便、快捷，並可模切成各種形狀，而且持久的黏彈性可避免脆化及斷裂的現象，所以不論在工業或是家庭的使用中都是十分的廣泛簡便。

而感壓膠製品包含保護膜、黏性膠帶、標籤及圖表磁帶等產品，預估至 2015 年其每年將成長 5%，而亞太地區為最大製造來源佔 47%，而目前許多的新型黏著劑與 PSA 膠相關技術，正發展蓬勃，並開發了許多新應用，讓產業市場變得更多元化！

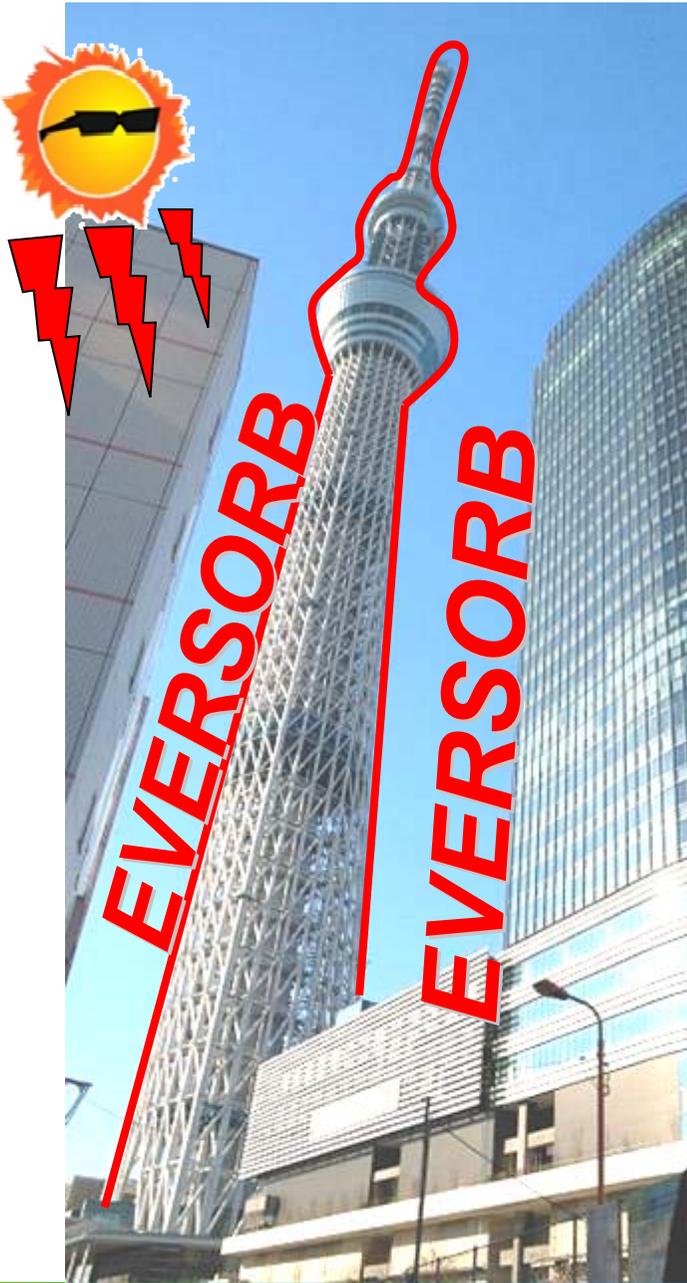
而塑膠中心特於 10/26 (五) 邀請了德淵企業股份有限公司 莊孝根 研發副總，從材料、製程及應用角度來看感壓膠的發展，另外更邀請到藤森工業株式會社 長倉 毅 R&D 主管，來講解黏著劑配方於不同產品/產業中應用的設計要點，另外也邀請到台灣永光化學 楊永吉 技術副理，來說明光穩定劑應用於乳化與UV硬化型壓克力膠的技術研究。最後邀請到博威電子 林輔樂 董事長，來說明塗佈技術及機能性 PSA 的應用，希望透過其感壓膠相關廠商的分享，能帶給台灣業界不同面向的商機開發方向思考。

### ※10/26 (五) 研討會流程

時間	主題	邀請講者
9:00-10:30	【Overview of PSA from material, process and application】	莊孝根 研發副總 德淵企業股份有限公司
10:30-10:40	Break Time	
10:40-12:00	【粘著劑配方於不同產品/產業應用的設計要點】	長倉 毅 (Takeshi Nagakura) R&D 主管 藤森工業株式會社
12:00-13:00	Lunch Time	
13:00-14:30	【光穩定劑應用於乳化與UV硬化型壓克力膠的技術研究】	楊永吉 技術副理 台灣永光化學工業股份公司
14:30-14:40	Break Time	
14:40-16:20	【塗佈技術及機能性 PSA 的應用】	林輔樂 董事長 博威電子股份有限公司
16:20~	賦歸	







*Thank you for  
your attention*

有任何問題歡迎到  
永光展位洽談