

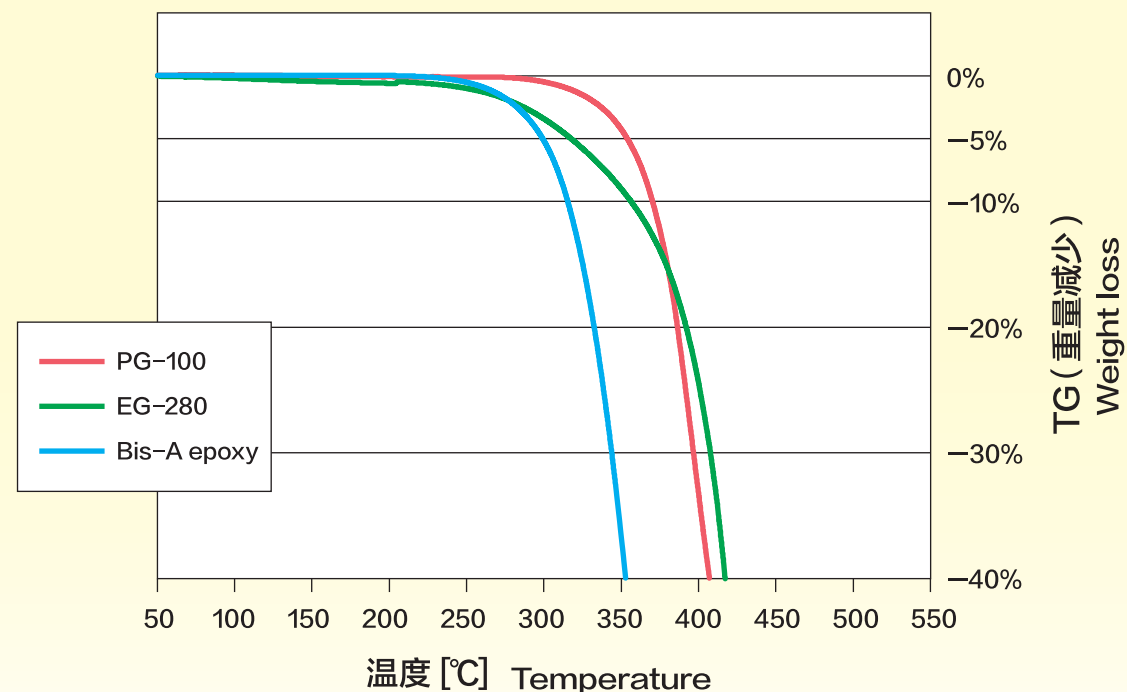
芴系环氧树脂

Fluorene Epoxy Resin

高耐热·高柔软性·高折射率

High heat resistance, High flexibility, High refractive index

TG-DTA参数 (全部牌号) / TG-DTA data (All Grades)



测定条件
Measuring condition

气氛: N₂
Atmosphere: N₂

升温速度: 10 °C/min
Rate of temperature increase: 10 °C/min

产品名 product name	OGSOL PG-100	OGSOL EG-280	Bis-A 环氧树脂 Bis-A epoxy	测定条件 Measurement condition
耐热性 (5%重量减少) Heat resistance (5% reduction)	354	368	280	TG

溶剂溶解性 / Solubility for various solvent

〈试验方法〉Test method

针对各溶媒按照20wt%的比例混合, 评估针对各溶剂的溶解性。
Each OGSOL was blended in each solvent at 20wt%, and the solubility was evaluated as following Criteria.

分类 Solvent group	溶剂 Solvent type	OGSOL PG-100	OGSOL EG-280
酮 Ketone	MEK (丁酮) Methyl ethyl ketone	×	◎
	MIBK (甲基异丁酮) Methyl isobutyl ketone	×	◎
	环己酮 Cyclohexanone	◎	◎
酯 Ester	丙二醇单甲醚乙酸酯 Propylene glycol monomethyl ether acetate	×	◎
	醋酸乙酯 Ethyl acetate	×	◎
其他 Others	甲苯 Toluene	×	◎
	乙二醇单甲醚 Ethylene glycol monomethyl ether (cellosolve)	×	◎
	γ-丁内酯 γ-Butyrolactone	◎	◎

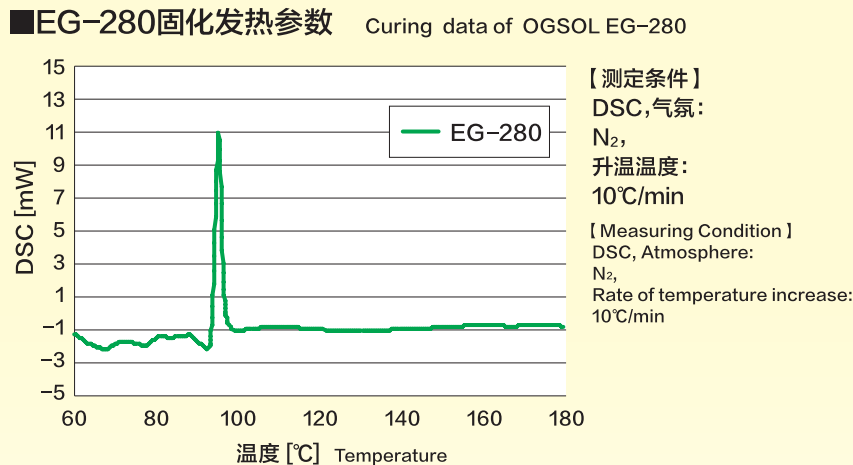
判定基準 / Criteria	
◎	常温可溶解 Soluble at an ambient temperature
○	加熱時 (50℃) 时可溶 Soluble at an elevated temperature (50℃)
△	濃度10wt%时可溶 Soluble at 10wt% concentration
×	不溶 Insoluble

【条件】Condition
温度: 常温
Temperature: Normal temperature
浓度: 20wt%
Concentration: 20wt%
搅拌方法: 通过搅拌机混合
Stirring: Using a shaker
评估方法: 目视
Evaluation: Visual observation

EG-280的低温固化 / Curing at low temperature of OGSOL EG-280

低弹性的EG-280在特定的条件下100 °C以下低温固化是可能的。另外室温在起始剂存在的情况下有很好的保存稳定性。

EG-280 having low elasticity is curable at low-temperature less than 100 °C under specific conditions. And it has excellent storage stability at room temperature even though under co-existence initiator.



■保存稳定性数据

Data of preservation stability

保存天数 (日) Elapsed time [day]	0 (混合后)	1	7	10	14
粘度 [mPa · s] Viscosity [mPa · s]	7,000~8,000	7,000~8,000	7,000~8,000	7,000~8,000	7,000~8,000

【试验方法】
Test Condition

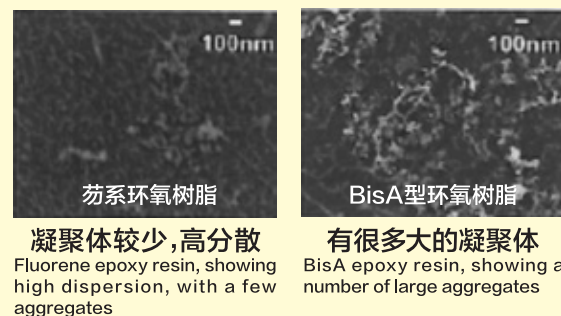
保管条件: 室温
Storage condition:
Room temperature

粘度测定: E型粘度计
Method of viscosity: E-type

芴系环氧树脂的炭素分散性 / Carbon dispersibility of Fluorene epoxy resin

芴系环氧树脂和炭素的亲和性很高, 有很好的分散性。
Fluorene epoxy is superior in carbon dispersibility due to the good affinity with it.

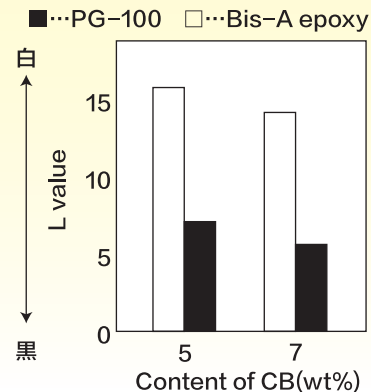
■分散性 SEM画像 Dispersibility SEM image
环氧树脂混合在炭黑里, 制作混合物。
通过SEM观察分散性。(固化剂: 胺)
A composite is made by mixing carbon black into epoxy resin. Dispersibility is observed via SEM (with an amine-based curative agent).



■黑色度测定 Black degree measurement

测定条件: PG-100和Bis-A环氧树脂和5wt%和7wt%比例的炭黑混合, 通过测色计的L值来测定黑色度。
Measurement method: Measure L value by colorimeter when blended 5wt% and 7wt% of carbon black (CB) in each of PG-100 and Bis-A epoxy.

PG-100的L值是Bis-A环氧树脂的一半以下。黑色度很高, 表示炭素有很好的分散效果。
L value of PG-100 is less than half compared of that of Bis-A epoxy. so, it indicates that the carbon is dispersed at more fine particles.



‘Matsukane’

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高耐热·高柔软性·高折射率

芴系环氧树脂

High heat resistance, High flexibility, High refractive index
Fluorene epoxy resin

芴系环氧树脂

Fluorene Epoxy Resin

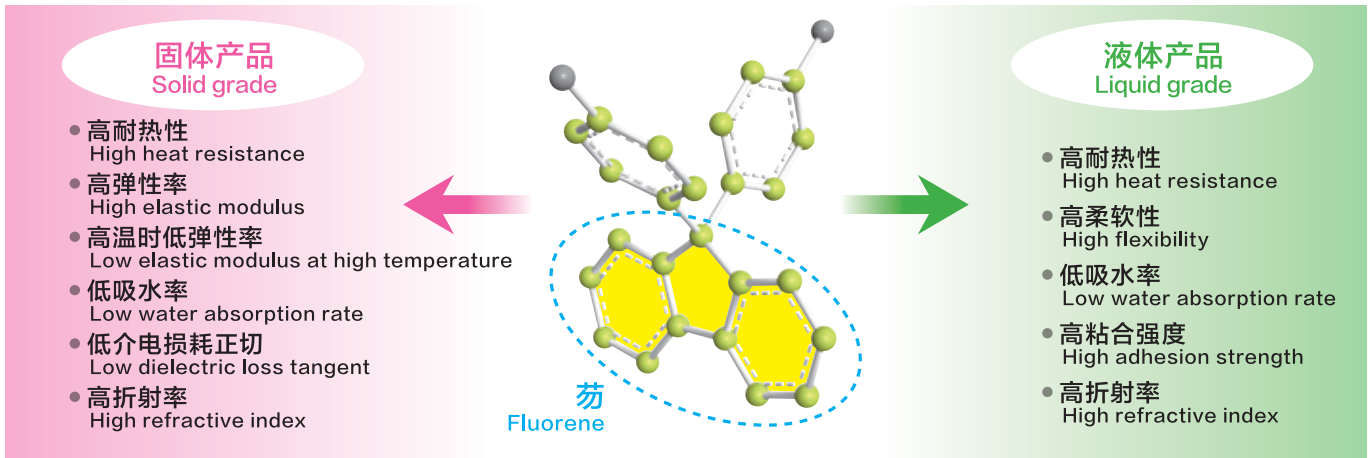
高耐热・高柔软性・高折射率

High heat resistance, High flexibility, High refractive index

刚直的芴系构造环氧树脂树脂。由于具有立体的大型轴节（合叶）结构，拥有一般环氧树脂所没有的优质特性。

The fluorene epoxy resin has the three-dimensional and special bulky cardo (hinge) structure. Therefore, it can be expected superior properties compared to those of conventional epoxy resins.

芴系环氧树脂的特点 / Features of Fluorene epoxy resins



预期用途 / Expected Application

液体密封胶, 固体密封胶, 层间绝缘膜, 光学用粘结剂, 光刻添加剂等。
Liquid encapsulants, solid encapsulants interlayer insulating film, optical adhesive, resist additives and more...

牌号一览 (环氧树脂数据) / Grade Lineup (epoxy resin data)

		固体牌号 Solid grade	液体牌号 Liquid grade	比较对象 (Reference)	
产品名 product name		OGSOL PG-100	OGSOL EG-280	Bis-A 环氧树脂 Bis-A epoxy	测定条件 Measurement condition
外观 Appearance	—	白色固体 White solid	淡黄色液体 Light yellow liquid	透明液体 Clear liquid	目视 Visual observation
环氧树脂当量 Epoxy equivalent	g/eq	260	460	190	滴定法 Titration method
氯含量 Total chlorine	ppm	1,200	170	—	燃烧法 Combustion method
粘度 Viscosity	mPa·s	350 (150℃)	7,440 (25℃)	2,350 (25℃)	E型 E type
折射率 (D线) Refractive index (D line)	—	1.64	1.55	1.58	25℃, 589nm 阿贝 Abbe
耐热性 (5%重量减少) Heat resistance (5% reduction)	℃	354	368	280	TG N ₂ 气氛 N ₂ atmosphere
相容性 Compatibility	Bis-A环氧树脂 Bis-A epoxy	◎	◎	—	下記参考 See below
	Bis-F环氧树脂 Bis-A epoxy	○	◎	—	
	酚醛树脂 Phenol Novolac	○	◎	—	
包装 Packing		20kg/纸袋 Paper bag	18kg/灌装 Oil tin	—	—

※相容性
comatibility

和Bis-A环氧树脂, Bis-F环氧树脂混合时的相容性是目测确认。另外也确认了放置1天后是否有再析出。
Comotability of each OGSOL with Bis-A epoxy, Bis-F epoxy and phenol Novolac was visually observed, and snyre-precipitation was observed also after the sample was left for one day at an ambient temperater.

混合比率: 50/50 混合温度: 加温到树脂熔化 (70℃~200℃) 加温方法: 电热板加热
Mixing ratio: 50/50 Mixing temperature: warming until melting both resins (70℃~200℃) Heating method: hot plate

判定标准: ◎ 相溶后没有析出 ○ 相溶后有析出倾向
Judgment criteria: ◎ Re-precipitation was not confirmed. ○ The tendency to re-precipitation was seen.

◆表中数据为参考值, 不是保证值
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固体牌号 (PG-100) Solid grade

固化剂参数 / Cured Material Data

■ 酚类固化参数 / 固化条件: 175℃×5小时 固化剂: 酚醛树脂 固化触媒: TPP
Data of materials Cured with phenol / Curing Condition :175℃, 5hours Curing agent : Phenol nobolac Curing catalyst : TPP

产品名 Product name		OGSOL PG-100	(比较对象) (Reference) Bis-A环氧树脂 Bis-A epoxy	测定条件 Measuring condition
Tg (DMA)	℃	181	135	tan δ JIS K 7244
Tg (TMA)	℃	166	122	JIS K 7197
线膨胀系数 (25~150℃) Linear expansivity	ppm	61	89	
线膨胀系数 (150~240℃) Linear expansivity	ppm	153	175	JIS K 7171
弯曲弹性率 (25℃) Flexual modulus	MPa	3,250	2,910	
吸水率 water absorption rate	%	0.18	0.17	JIS K 7209
介电常数 Dielectric constant	ε _r (1GHz)	3.3	3.3	ASTM D150
	ε _r (10GHz)	3.0	3.0	
介电正切 Dielectric tangent	tan δ (1GHz)	0.031	0.034	ASTM D150
	tan δ (10GHz)	0.032	0.034	

■ 酸酐固化数据 / 固化条件: 150℃×5小时 固化剂: MeHHPA 固化触媒: TPP
Data of materials Cured with Acid anhydride / Curing Condition :150℃, 5hours Curing agent : MeHHPA Curing catalyst : TPP

折射率 (D线) Refractive index (D line)	—	1.59	1.54	25℃ 589nm 阿贝 Abbe
Tg (DMA)	℃	205	158	JIS K 7197

耐热黄变性试验 Thermal yellowing test

PG-100耐热性非常好, 特点是加热到150℃比Bis-A变色要少。
Features of PG-100 is that color change when heated at 150° C less than Bis-A.

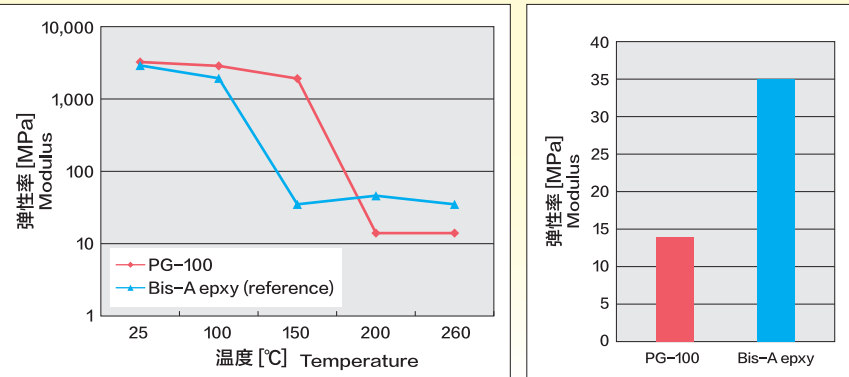


固化条件: 115℃×5小时 固化剂: MeHHPA 固化触媒: TPP 固化物厚度: 200μm
Curing Condition :115℃×5hours Curing agent : MeHHPA Curing catalyst : TPP Thickness : 200μm

不同温度弹性率 Elastic modulus by each temperature

芴系环氧树脂在一定温度下维持高弹性率的同时, 高温时弹性率会急速下降。
Fluorene epoxy resin has unique properties that keep high elasticity at some temperature, while dramatically dropped at a high temperature.

固化条件: 115℃×5小时
Curing Condition :115℃×5hours
固化剂: MeHHPA
Curing agent : MeHHPA
固化触媒: TPP
Curing catalyst : TPP



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液体牌号 (EG-280) Liquid grade

固化物参数 / Cured Material Data

■ 酚类固化参数 / 固化条件: 175℃×5小时 固化剂: 酚醛树脂 固化触媒: TPP
Data of materials Cured with phenol / Curing Condition :175℃, 5hours Curing agent : Phenol novolac Curing catalyst : TPP

产品名 Product name		OGSOL EG-280	(比较对象) (Reference) Bis-A环氧树脂 Bis-A epoxy	测定条件 Measuring condition
Tg (DMA)	℃	20	135	tan δ JIS K 7244
Tg (TMA)	℃	-4	122	JIS K 7197
线膨胀系数 (25~150℃) Linear expansivity	ppm	83	89	
弯曲弹性率 (25℃) Flexual modulus	MPa	N.D	2,910	速度: 50mm/min 剥离幅度: 10mm Speed: 50mm/min Peeling distance: 10mm
铜粘合试验 Bond test (copper)	N	>2	1.1	1MHz ASTM D 150

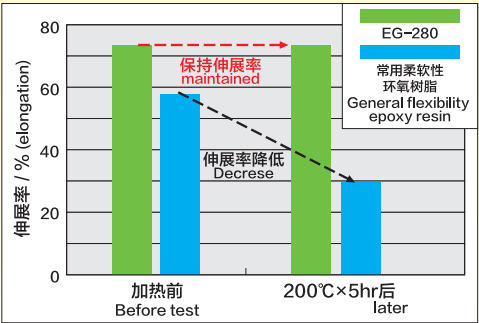
■ 酸酐固化数据 / 固化条件: 150℃×5小时 固化剂: MeHHPA 固化触媒: TPP
Data of materials Cured with Acid anhydride / Curing Condition :150℃, 5hours Curing agent : MeHHPA Curing catalyst : TPP

折射率 (D线) Refractive index (D line)	—	1.55	1.54	25℃ 589nm 阿贝 Abbe
Tg (DMA)	℃	70	158	JIS K 7197
缺口冲击试验 Izot impact test	J/m	N.D	1.6	1MHz ASTM D 150

EG-280的特点 (酚类固化) Feature of EG-280 (curing by phenol)

G-280的酚类固化物与常用的柔软环氧树脂比较, 加热后柔软性也能保持。
EG-280 is maintained flexibility compared with general-purpose flexibility epoxy resin.

固化条件: 115℃×5hr 固化剂: 酚醛树脂 固化触媒: TPP 1wt%
Curing condition : 115℃, 5hour Curing agent : phenol novolac Curing catalyst : TPP 1wt%
加热时间: 200℃×5hr
Heating time: 200℃, 5hour



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