

Investment Opportunities in the Polymer Material Industry in Taiwan

I. 10 Reasons to Invest in the Polymer Material Industry in Taiwan

- A. Taiwan is recognized as the leader in chemical material management and technology, while its industry leadership is built on proven flexibility, quality and delivery date.
- B. While China market is the target market, Taiwanese manufacturers still have more competitive edges over Chinese ones, achieving a throughput of 700 billion NTD with sizable plants.
- C. Compared with those in Europe & US, manufacturers in Taiwan have the advantages of anti-dumping duties and geographical location in China market, making instant supply and favorable position possible.
- D. Among the polymer materials imported to China, products made in Taiwan account for 16%, only second to South Korea in the world.
- E. The supply chain of the upstream petrochemical structure is complete and competitive; low import taxes of the raw materials also help to satisfy the demand.
- F. Taiwanese manufacturers have downward-integrated the spinning and adhesive industries, and developed long-term partnership with downstream industries such as rubber, coating, and automotive parts and accessories.
- G. Capital financing is easier in Taiwan and the acquisition cost is relatively low; compared with manufacturers in China, the risks are fewer.
- H. As labor shortage and poaching in Taiwan is not as common as in China, the turnover rate of personnel is relatively low, enabling in-depth technology development.
- I. Electricity supply is more stable than China, accelerating the production of roll to roll process products.
- J. Economies of scale are vital to chemical industry: the ABS productivity/throughput in Taiwan rank second in the world, and nylon industry ranks the third.

II. Advantages of Polymer Material Industry in Taiwan

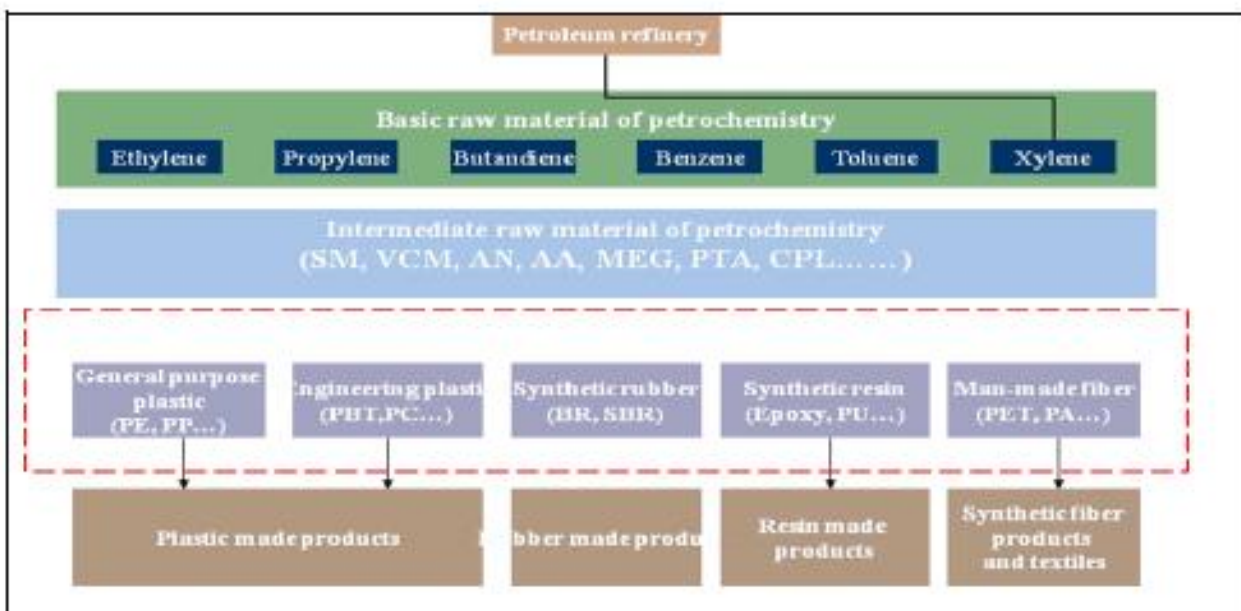
- A. Stable supply of raw materials: The chemical industry in Taiwan is of good health; upstream petrochemical raw materials are sufficient, and the import taxes for key materials are low, both helping to stratify the demand.
- B. Thriving applications of downstream industries: The world's leading downstream ICT & electronics chain and the central-satellite factory system of automotive parts & accessories (such as lights and collision parts) have laid the foundation for chemical material manufacturers to prosper in Taiwan.
- C. Favorable position to enter China market: While global manufacturers are competing fiercely for China market, Taiwan ranks second (16%) in terms of the polymer material import to China.
- D. Relative advantage in management and technology: Taiwanese manufacturers have more competitive edges over Chinese ones in regard to management and technology, with proven flexibility, quality and delivery date well known in the world.
- E. Relative vantage in base environment: Financing capitals is easier in Taiwan, and its cost is relatively low; the turnover rate of personnel is relatively low, enabling in-depth technology development; and the stable electricity supply accelerates the production of roll to roll process products.

III. Status Quo of Polymer Industry in Taiwan

A. Overview of Polymer Material Industry

Polymer materials include general plastics, engineering plastics, synthetic rubber, synthetic resin and man-made fiber materials, all synthesized with intermediate materials produced by base materials of petrifaction. They can be used as the raw materials for downstream plastics, rubber, resin, man-made fiber and spinning industries. Polymer materials are widely applied to daily needs such as information electronics, automobile, spinning, architecture and medicine (see Figure 1 as the industrial chain).

Figure 1. Industry Chain of Polymer Materials



B. Structure and Characteristics of Polymer Material Industry in Taiwan

According to the categorization from Department of Statistics, Ministry of Economic Affairs, polymer material industry in Taiwan is composed of two sub-industries, “synthetic resin & plastics” and “synthetic rubber.”

In terms of development, since upstream/middle-stream general plastics and synthetic rubber require nearby supply of raw materials, most plants are located in CPC 3rd/5th naphtha cracker plants in Kaohsiung and Formosa Plastics 6th naphtha cracker plant in Yunlin. Middle-stream/downstream plants, however, are located mostly at the industrial parks in Taoyuan/ Miaoli/ Taichung/ Changhua/

Tainan/ Kaohsiung, setting closer to its manufacturers. In terms of business groups, polymer material industry in Taiwan can be roughly divided into two: pan-CPC Corporation and Formosa Plastics Group. While vendors belonging to pan-CPC Corporation are spread in Linyun and Renwu-Dashe industrial parks near 3rd/4th/5th naphtha cracker plants, those belonging to Formosa Plastics Group are located in Mailiao, Yunlin.

Table 1. Downstream Manufacturers of CPC 5th Naphtha Cracker Plant

	Downstream manufacturers of 5 th Naphtha Cracker Plant (Kaohsiung)
Ethylene Derivatives	USI, Formosa Plastics, APC, China Man-Made Fiber Corporation (CMFC), Oriental Union Chemical Corporation (OUCC), LCY Chemical, Taiwan VCM Corporation, Dairen Chemical Corporation, Grand Pacific Petrochemical Corporation, and Taiwan Styrene Monomer Corporation
Propylene Derivatives	China Petrochemical Development Corporation (CPDC), Formosa Plastics (Yungsox), LCY Chemical (LYC Technology), and Taiwan Prosperity Chemical Corporation
Butadiene Derivatives	TSRC Corporation, Chimei, NANTEX, Grand Pacific Petrochemical Corporation, Delta Electronics, Crosline Chemical Industries, and Shin-Foong Chemical Industry
Benzene Derivatives	Formosan Union Chemical Corporation, Grand Pacific Petrochemical Corporation, Taiwan Styrene Monomer Corporation, CPDC, and Taiwan Prosperity Chemical Corporation
Others	CPDC (syngas and carbon monoxide) and China Synthetic Rubber Corporation (Carbon Black Feed)



Source: ITRI

Figure 2 Map of CPC and its surrounding factories

In terms of industrial characteristics, the polymer material industry in Taiwan has the following points of note:

1. The domestic market in Taiwan is slowly declining, and exporting has become the key point of industrial development, China has become the main exporting market, several industry leaders have set up factories in China for ease of supply.
2. General plastic requires scalable production and management, through stable material sources and the removal of downstream production companies on both straits, Taiwan manufacturers manage a key competitive advantage through the maintaining of cost and quality control.
3. The production formula of synthetic resin and synthetic rubber is often adjusted according to the downstream clients' requirement, the technological ability and flexible operation model has become a key advantage, and many are reverse developing an integration towards material sources.
4. The polymer material industry in Taiwan is a capital and technology focused industry, the further upstream the higher material and utility cost ratio becomes, mostly amounting 85% of the total costs. Also the scalability in production is an advantage; even though further downstream the scalability ability weakens, but the need for customization increases, leading to competitive edge in technology, also the gross profit margin increases.
5. There are only about 300 polymer material manufacturers in Taiwan, mostly of a certain scale (most of them having a capital of over NTD100,000,000), and also possessing a higher output value per capita; in addition, the manufacturers often require employees of certain experience levels, leading to quality advantage and costs of entry.

C. Overview of Polymer Material Market in Taiwan

The polymer material industry plays an integrated part in the overall chemical industry of Taiwan. Aside from being the foundation of petrochemical industry's vertical integration, it also offers the electronic information, automobile, bio-tech food and construction industries of Taiwan indispensable material supply. Therefore we will hereby conduct a market analysis based on its output value and import/export conditions.

1. Analysis of Output Value

According to a statistics from 2009 to 2013, the CAGR of output value for polymer material industry in Taiwan reached up to 6.72%. Annually speaking, the output value (mostly coming from synthetic resin & plastics manufacturing) was 649.3 billion in 2013, with a 2.04% increase compared with 2012.

Table 2. Output Value for Polymer Material Industry in Taiwan, 2009-2013

Unit: Thousand in NTD

	Synthetic Resins & Plastics	Synthetic Rubber	Polymer Material Sum	Annual Growth
2009	467,526,344	33,019,222	500,545,566	-17.50%
2010	620,916,180	47,001,154	667,917,334	33.40%
2011	638,114,372	58,754,712	696,869,084	4.33%
2012	585,867,553	50,451,976	636,319,529	-8.69%
2013	608,641,402	40,649,347	649,290,749	2.04%

Source: Department of Statistics, MOEA ,2013.3

2. Import/Export Analysis

Even though the polymer material industry has a very high output value and significant growth, what is worthy of note is that Taiwan's polymer industry still have a very high dependency in the case of export, according to the statistics from 2007 to 2011, export ratio was lowest in 2009 at 66.6%, and reached a height of 88.8% in 2008. Therefore an analysis on import/export statuses should be conducted and its development studied. Overall speaking, whether in trading amount and weight, the export of polymer material has exceeded the import amount in Taiwan, leading to a significant trading surplus for Taiwan. In addition, aside from a slight decline in 2009 due to the global financial crisis, in recent years both the import and export value have been growing annually. Therefore showing that polymer material is often used in the application of consumer necessities, maintaining a steady growth in a volatile economy.

Table 3 Import/Export Analysis of Taiwan Polymer Material between 2008-2011

Unit: Million in NTD; Ton

Time	Import		Export		Trade Surplus	
	Amount	Weight	Amount	Weight	Amount	Weight
2008	95,959	1,136,013	391,178	6,927,109	295,219	5,791,096

2009	73,945	1,004,823	340,850	7,494,355	266,905	6,489,532
2010	110,296	1,318,563	445,106	7,840,656	334,810	6,522,093
2011	121,641	1,400,558	472,724	7,586,855	351,083	6,186,297

Source: ITRI

As shown in Table 4, China is the target market for polymer material export from Taiwan, achieving 41.2% of total export. If Hong Kong market also included, more than half of Taiwan's polymer material export were shipped to Great China market, indicating whether the demand of Great China market can maintain a strong growth in the future will be the key to Taiwan's polymer material industry development. As for import, Japan ranks first for the import country, showing Taiwan's existing demands in high-unit-price products, yet the vendors have advanced relevant technologies to increase the ratio of self-sufficiency in recent years.

Table 4. Analysis of Polymer Material Import/Export in Taiwan, 2011

Rank	Import		Export	
	Country	Percentage	Country	Percentage
1	Japan	26.2%	China	41.2%
2	US	18.7%	Hong Kong	12.8%
3	South Korea	9.2%	Japan	5.4%
4	China	8.7%	Vietnam	5.0%
5	Thailand	5.5%	India	3.7%
	Others	31.7%	Others	31.9%

Source: Public Information Observation, CDRI

IV. Operation of the Main Polymer Material Manufacturers

Taiwan has been called 'The Kingdom of Plastic', which is directly related to the prosperous development of the polymer industry in Taiwan. It is also due to the collective effort of all manufacturers over the years of development. Hereafter we will introduce the main players in the polymer manufacturing industry, and offer an analysis on their operations.

A. Overview of the Main Polymer Material Manufacturers in Taiwan

To further understand the polymer industry in Taiwan, we should break the manufacturers further down into different categories. However many of these manufacturers have production lines for various categories, thus we've elected to select their representative production lines in terms of five categories, namely general plastic, engineering plastics, synthetic resins, synthetic rubbers and others. In each category, we have elected one or two leading manufactures and present them hereafter:

Table 5. Representatives of Various Polymer Materials in Taiwan

Category	Representative Manufacturer	Plant Location	Deployment
General Plastics	Formosa Plastics Group	Mainly in Mailiao (Yunlin), and partially in Ren-Da industrial park (Kaohsiung); some are located in China and US	Vertically integrating from oil refining to plastics/man-made fiber
	USI Group	Mainly in Ren-Da/Linyun industrial parks, and partially in Miaoli; planning to build some plants in China	Focusing on five general plastics, and planning to backward integrate the upstream naphtha cracking plants
Engineering Plastics	Shinkong Synthetic Fibers Corporation	In Guanyin/Zhongli (Taoyuan)/Hangchow (China); co-investing with international manufacturers to build some plants in Singapore/Thailand	Starting with chemical fiber to upwardly develop PET materials, and deploying in engineering plastics, PET bottles, and optical materials
	Zig-sheng Industrial Corporation	With polymerization plants located in Guanyin/Dayuan (former Hua-Ran)	Starting with silk-processing for upstream development, with most plants built in Taoyuan; long-term deployment in Taiwan
Synthetic Resin	Chang Chung Group	In Hsinchu, Kaohsiung, Mailiao, and Miaoli; with deployment in China	Starting with resin products for upward integration, with in-depth deployment in electronic materials
	Eternal Chemical	The plant in Taiwan is located in	Starting with resin

Category	Representative Manufacturer	Plant Location	Deployment
		Kaohsiung; with plants in Tianjin, Kunshan, and Changshu (China)	products for downstream deployment in electronic materials
Synthetic Rubber	TSRC Corporation	The plant in Kaohsiung; with plants in Nantong (China); co-investing with Indian and German manufacturers	Focusing on synthetic rubber for global deployment and diversified development
Others	Far Eastern New Century	In Taiwan; co-deploying with international manufacturers and vigorously investing in China	Developing in upstream/downstream petrification spinning industry such as polyester, also re-investing in cement, finance, telecommunications, and general merchandises
	Tainan Spinning	Thoroughly developing Taiwan market; with long-term deployment in Southeast countries such as Vietnam	Focusing on cotton and polyester in fiber industry, with upstream/downstream vertical integration

Source: CDRI

B. Operational Overview of the Main Polymer Material Manufacturers in Taiwan

1. General Plastics

This category includes domestic manufactures of top 5 general plastics: PE, PP, PVC, PS, and ABS. USI ranks first in terms of net profit margin, followed by Asia Polymer Corporation (APC) (second place) and CHINA GENERAL PLASTICS (third place). The Ocean Plastics Co got the lowest Net Profit Margin.

Table 6. Operation of the Main Manufacturers for General Plastics in Taiwan, 2012

Unit: Million in NTD

	2012		
	Revenue	Net Profit Margin	ROE
Formosa Plastics	173,034	8.47%	6.27%
USI	10783	15.39%	9.89%
APC	4790	12.91%	6.74%
Formosa Chemicals & Fiber Corporation (FCFC)	288024	2.46%	2.98%
Rong-Hua	29668	2.06%	2.69%
Nan-Ya Plastics Corporation (NPC)	183042	2.3%	1.65%
Ocean Plastics Co	4901	-2.60%	--2.45%
CHINA GENERAL PLASTICS	7968	10.01%	15.3%
CHI MEI MATERIALS TECHNOLOGY	19343	8.33%	19.41
GARND PACIFIC PETROCHEMICAL	17565	9.91%	12.49%
Taita Chemical Company	10,834	2.5%	6.68%

Source: Public Information Observation, CDRI

2. Synthetic Rubber

Synthetic rubber includes BR, SBR and NBR etc. Having large NBR market share in Asia, NANTEX Industry delivers excellent net profit margins.

Table 7. Operation of the Main Manufacturers for Synthetic Rubber in Taiwan, 2012

Unit: Thousand in NTD

	2012		
	Revenue	Net Profit Margin	ROE
TSRC	17056	15.09%	15.61%
NANTEX	5510	6.45%	6.25%

Source: Public Information Observation, CDRI

3. Engineering Plastics

Engineering plastics include PBT, POM, PC, Nylon and mPPO etc, aside from Ginar, who specializes in engineering plastic compounds, other manufacturers show higher revenue in engineering plastics. With years of development, Changchun Plastics has seen a gradual growth of revenues as well as high increase in net profit margins in recent years; Shinkong and Zig-Sheng both have artificial fiber related operations, which are heavily influenced by the pricing of their upstream material, thus showing a lesser performance compared to Changchun and Ginar. But compared to other manufacturers of synthetic fibers these manufacturers already display a better performance, with relative room for growth in the future.

Table 8. Operation of the Main Manufacturers for Engineering Plastics in Taiwan, 2012

Unit: Million in NTD

	2012		
	Revenue	Net Profit Margin	ROE
Shinkong Synthetic Fibers Corporation	24,870	3.87%	4.21%
Changchun Plastics	53126	23.29%	18%
Zig-sheng Industrial Corporation	16997	-0.58%	-1.43%
Ginar Technology	1296	3.97%	6.29%

Source: Public Information Observation, CDRI

4. Synthetic Resin

Covering the production & manufacture of upstream petrification materials, Chang-Chun PetroChemical is the key intermediate manufacturer for polymer materials in Taiwan. Because of its advantageous products of electronic chemicals, Eternal Chemical really stands out in recent years. Although having relatively small revenues, Great Eastern Resins Industrial Corporation specializes in technology development and focuses on market segmentation, delivering the best net profit margins in the past few years.

Table 9. Operation of the Main Manufacturers for Synthetic Resin in Taiwan, 2012

Unit: Thousand in NTD

	2012		
	Revenue	Net Profit Margin	ROE
Chang-Chun PetroChemical	41,536	12.43%	12.46%
Eternal Chemical	16,834	7.5%	6.87%
Qualipoly Chemical Corporation	4,047	4.52%	14.49%
SUNKO INK	1,550	0.01%	-4.80%
Evermore Chemical Industry Corporation	1,939	4.61%	2.35%
Daily Polymer Corporation	1,403	4.82%	8.37%
YONG SHUN CHEMICAL	1,831	2.49%	4.00%
Lian-Chao	2,813	2.20%	21.98%
DSM_-AGI	2,372	-7.79%	-14.21%
Swancor	1,599	16.33%	16.54%
Tex Year Industries Inc.	1,472	5.06%	7.93%
Headway Group	985	14.05%	8.34%

Source: Public Information Observation, CDRI

5. Others (Plastic Materials for Spinning)

Plastics such as PET and Nylon are mostly used for spinning and manufacturers usually vertically integrate downstream industries with diversified strategic operations, so they are categorized into “Others.” Starting with spinning, Far Eastern New Century has upward integrated in PET industry and grown significantly in PET bottles, attracting investors worldwide. Because of its early development & deployment in Southeast Asia (Vietnam for example), the long-term investment in Tainan Spinning can be taken into consideration.

Table 10. Operation of the Main Manufacturers for Plastic Materials for Spinning in Taiwan, 2012

Unit:Million in NTD

	2012		
	Revenue	Net Profit Margin	ROE
Far Eastern New Century	60,682	14.36%	7.85%
Tainan Spinning	15,460	4.32%	2.81%
Lealea Group	14,100	5.58%	7.20%
	2012		
	Revenue	Net Profit Margin	ROE
CHINA PETROCHEMICAL DEVELOPMENT	36,893	3.84%	3.84%
LI PENG	25,778	0.12%	0.36%
Chainlon	8,197	-1.99%	-0.90%

Source: Public Information Observation, CDRI

V. Analysis of Polymer Material Industry Investment in Taiwan

A. Benefits that ECFA has brought to Taiwan Polymer Material Industry

1. Direct Benefit

Since the custom taxes to export to China have decreased, polymer material manufacturers have gained some competitive edges in China. As indicated in the list, the enlisted items with the appeal of quantity can rarely benefit the general plastics manufacturers in Taiwan. For some industries that are not included in Early Harvest List, as their downstream products had an increase in production quantity as a result of ECFA's lower custom taxes, their purchase of raw materials has increased as well. Industries such as adhesives, man-made fiber yarn, paints, coating ink and man-made leather are listed and are expected to generate demands in polymer materials such as upstream PA6, Polyester PVC and synthetic resin.

Generally speaking, the first phase of ECFA Early Harvest List has little direct benefit on polymer material industry in Taiwan. However, it's expected to include more items such as general plastics, engineering plastics, plastics for spinning and synthetic rubber, delivering more tax advantages for Taiwanese manufacturers to operate in China and increasing their revenues and profits.

B. SWOT Analysis of the Polymer Industry in Taiwan

The SWOT analysis of the polymer industry in Taiwan is as Table 11. Key points amongst the opportunities are the anti-dumping duties and the lowering of customs tax due to ECFA, which would enable Taiwan to further prosper. If these be effectively integrated with the advantages Taiwan businesses hold in management, technology, operation and finance, significant growth could be predicted.

Table 11 SWOT Analysis of the Polymer Industry in Taiwan

Advantages	Disadvantages
<ul style="list-style-type: none"> • The ability to manage and produce • Technology and ability to adjust formula • Vertical integration of cost control • Sufficient material supply at relatively low cost • Long-term collaboration with cross-strait downstream factories • Significant financial backings 	<ul style="list-style-type: none"> • Manufacturers in China have a relatively bigger advantage in competition in terms of quantitative production • Some of the high-end product market is still in mostly in the hands of Western or Japanese manufacturers. • International development outside from the China market still requires improvement
Opportunities	Threats
<ul style="list-style-type: none"> • Anti-dumping duty advantages • ECFA advantages of lowering customs charges • More stable supply of utilities such as water and electricity compared to China • Relatively more financing approaches and lower costs 	<ul style="list-style-type: none"> • China is cultivating the development of the industry in earnest • Increasing competition from Korean manufacturers • Increasing concern regarding environmental issues • Risk of material obtaining due to the relocation of CPC's 5th Naphtha Cracking Plant

Source: CDRI

VI. Summary and Suggestions

A. Summary

Since there's an apparent business cycle in polymer material industry, deploying during decline period and selling during growth period could generate stable and great profits. As for investment, the development of emerging businesses such as green energy – receiving worldwide attention as the oil price is high – has to depend on polymer materials. Considering its higher cost in comparison to normal

products, a profitable future is awaiting if manufacturers can concentrate on development and gain relevant certifications.

Polymer material industry requires heavy capital investment and advanced technology, the entry barrier is high. With the market growth slows down, potential new entrants are less likely to enter. The industry will continue to intergrate and the market will be more concentrated. Having the advantages of management, technology, ECFA and anti-dumping duties, Taiwan is highly competitive on the China market. As for emerging markets in Southeast Asia, Taiwanese manufacturers has early deployed here, while looking for opportunities to work with pioneering European/US manufacturers on technologies or to co-invest/merge with them.

It is the continuously effort of Taiwanese manufacturers in vertical intergration or diversification over years. This industry is expected to have higher value and more opportunities in the future.

A. Suggestions for Product Investment

As for investment opportunities in polymer material products, this section is divided into five categories: general plastics, engineering plastics, plastic materials for spinning, synthetic rubber and synthetic resin.

1. **General Plastics:** In pursuit of Economies of Scales, with stable long-term profits and relatively high net profit margins. Group enterprises are the top choice, and because of oil-price vulnerability, PP is the potential product in the long run.
2. **Engineering Plastics:** has relatively small market-scales; technology and raw materials play important roles; fewer opportunities in single product specification; still PC included in ECFA Early Harvest List has great opportunities for market expansion.
3. **Plastic Materials for Spinning:** In pursuit of Economies of Scale, enterprises with downstream spinning & processing manufacturers are the premier choice. In the short term, Nylon has higher entry barriers but more global competitive edges. However, PET has lower level of technology but more stable profits than Nylon in the long term.
4. **Synthetic Rubber:** As its downstream market is very likely to replace plastic products, its growth rate is much higher than others considering its recyclability and relatively shorter base period. The profits gain depends on manufacturers' control over butadiene since its volume production is more difficult, and thus becomes the key to long-term profiting.
5. **Synthetic Resin:** Includes acrylic and PU resin in the ECFA Early Harvest List, with applications in electronics, photonics and green energy as the premier choice.