

Investment Opportunities in the Electronic Materials Industry in Taiwan

I. Reasons To Invest in Taiwan's Electronic Materials Industry

1. Taiwan has a 9.2% share of the passive elements market, making it number two in the world.
2. Taiwan has a 19.1% share of the optoelectronics elements market, giving it a rank of third in the world.
3. Taiwan has the world's second-largest LCD output.
4. The most extensive mid-/downstream electronic materials industry system.
5. Taiwan is the country with the best-defined electronic materials industry clustering effect.
6. Industry clusters in three major science parks provide a well-diversified supply chain.
7. Taiwan is home to the headquarters of many major global electronics system product OEM assembly firms.
8. Taiwan's OEM assembly plants are distributed around the world.
9. Thanks to ECFA, Taiwan is the ideal partner for foreign investors seeking to enter China.

II. Output value, industry structure, and product categories of Taiwan's electronic materials industry

Electronic materials are defined as industrial materials used in semiconductor manufacturing and bonding, and in such products as flat-panel displays, printed circuit boards, photovoltaic batteries, and lithium batteries. Electronic materials may be functional or may affect products' electrical characteristics; they consist of semiconductor materials, bonding materials, printed circuit board materials (PCB), flat-panel display materials, and energy materials.

1. According to the statistics of IEK, total output of Taiwan electronic materials industry was NT\$350 billion in 2013, and will reach NT\$387.3 billion in 2014 with 10.7% growth. Among all sub-industry, **bonding material, with NT\$97.9 billion and 27.97% of total electronic materials industry output share, is the biggest one. Followed by NT\$78.8 billion and 22.52% share of semiconductor manufacturing material. (Table 1)**
2. Because electronic materials must be designed and manufactured with downstream electronics industry applications in mind, finished product quality is very important, up-/downstream technology may change very quickly, and customers must obtain certification and place emphasis on branding, the industry has a high barrier to entry and long learning curve. As a consequence, however, electronic materials inevitably possess high added value, and some materials have a gross profit margin exceeding 50%. In addition, because the production of some materials requires a high investment in equipment, which has high depreciation and amortization ratios, product added value must be higher than that of the products of ordinary manufacturing and chemical engineering industries.
3. Taiwan had approximately 24 electronic materials firms with sales revenue exceeding NT\$10 billion, 38 firms with revenue of NT\$2-10 billion, and 16 firms with revenue of NT\$0.5-1.0 billion. This makes it apparent that

Taiwan's electronic materials manufacturers are developing in the direction of greater value, which is stimulating the development of the materials industry.

Table 1 Output Value of Electronic Materials Industry

Unit: NT\$ million; %

	2010	2011	2012	2013	2014(e)	2013 Growth (%)	Output Share (%)
Semiconductor Materials	69,196	66,970	72,608	78,842	85,307	8.59	22.52
Bonding Materials	84,004	80,326	90,094	97,912	104,766	8.68	27.97
PCB Materials	71,402	58,641	58,045	68,912	72,358	18.72	19.69
LCD Materials	56,201	51,035	54,506	59,738	60,892	9.60	17.06
Energy Materials	44,862	46,475	27,703	44,667	64,042	61.24	12.76
Total	325,665	303,447	302,956	350,071	387,365	15.55	100.00

Source: IEK(2014/02)

Table 2 Size class of firms in Taiwan's electronic materials industry

Revenues	Companies
First tier : More than 10 billion	Nan Ya Plastics - ASE - Changchun Petrochemical - Unimicron - Lee Chang Yung Chemical - Ho Tung Chemical - Taiwan Glass - Nan Ya PCB - Eternal - Wah Lee - SAS - ITEQ - BenQ Materials - San Chih - Kinsus - Young Fast - Green Energy Technology - Chang Wah - Wafer Works - Topco Scientific - Elite Material - Chipbond - SDI
Second tier : 2-10 billion	Taiwan Union - Formosa Sumco Technology - Wah Hong - Achem Technology - Wellypower - China Steel Chemical - Everlight - Shenmao - Taiflex Scientific - Shiny - Yee Fong - Uniplus - Hongthai - J Touch - Co-Tech - EPISIL Technology - GIO - Eversol - Entire Technology - Subtron - AGI - Fulltech fiber glass - Danen - HOPAX - KINIK - Photonics Semiconductor Mask - Glotech - Coremax - G-TECH Optoelectronics - Giga Solar Materials - Taiwan Mask - Efun - SWENC - HI-LIGHT TEK - Mechema - T.N.C. - HWA WOEI
Third tier : Less than 2 billion	Ampoc Far-East - Gamma - Chung Hwa Chemical - Yeh-Chiang - ShineMore Technology - Microcosm - Baotek - Gamma Optical - Transtouch Technology - AimCore - TFC - ThinFlex - Sintronic - HIROSE - eturbotouch - Exploit

Note: the scale of revenue by Year 2010 subject

Source: Companies; IEK of ITRI (2011/08)

III. Taiwan's electronic materials enjoy stable exports

Taiwan is home to the headquarters of many major global electronics system product OEM assembly firms. Some downstream segments of Taiwan's electronic materials industry are in the world's leading position which makes electronic materials enjoy stable exports. For instance, Taiwan's printed circuit boards ranked first place in the world with 27.8% share; IC substrate ranked second with 25.7% global share; and LEDs 18% global market share makes it in the third place in the world (Table 3). Taiwan's electronic materials industry thus enjoys stable exports.

As far as the industry chain is concerned, Taiwan's OEM plants are dispersed widely throughout Eastern Europe, China, India, Vietnam, and Central America. The industry's production lines can be applied to OEM assembly of final products such as NBs, cell phones, LCD TVs, digital cameras, electronic pets, game machines, and GPS, as well as to parts and components such as connectors, panels, ICs, cooling modules, and device shells, etc.

Table 3 Global status of downstream segments of Taiwan's electronic materials industry

	Year	Global Ranking	Output Value* (US\$ million)	Global Market Share (%)
Printed circuit boards	2010	1 st	10,935	27.10
	2011	1 st	11,560	27.60
	2012(e)	1 st	11,926	27.70
	2013(f)	1 st	12,350	27.8
	2014(f)	1 st	12,820	27.9
IC substrate	2010	2 nd	2,056	25.20
	2011	2 nd	2,118	25.50
	2012(e)	2 nd	2,195	25.60
	2013(f)	2 nd	2,281	25.70
	2014(f)	2 nd	2,372	25.70
LEDs	2010	3 rd	2,609	19.00
	2011	3 rd	2,877	20.00
	2012(e)	3 rd	3,025	19.00

	Year	Global Ranking	Output Value* (US\$ million)	Global Market Share (%)
	2013(f)	3 rd	3,347	18.00
	2014(f)	3 rd	3,593	18.00

Note: *Includes oversea production

Source: 2013 Electronic Material Yearbook; IEK (2012/08)

IV. Taiwan electronic materials industry contains an extensive, diversified supply chain

Apart from the world-famous Hsinchu Science Park, Taiwan's LCDs and materials industries are also clustered in the Southern Taiwan Science Park and Central Taiwan Science Park. Firms in these three major science parks constitute a highly diversified supply chain. The industry is closely linked with up- and downstream supply chain segments in the United States, Japan, and Korea, and Taiwan has the world's most complete electronic materials industry chain.

V. Taiwan electronic materials industry possesses superior backup production site criteria

In the wake of the Economic Cooperation Framework Agreement (ECFA), Taiwan's electronic materials industry has become a particularly favorable strategic partner for foreign investing firms engaging in preliminary technological applications and product development. The solid technological capacity of Taiwan's LCD and materials firms is worth a good look when foreign companies are looking for overseas backup production sites.

VII. The global electronic parts and components industry is on track to maintain a projected 30% growth trend over the next three years, and materials firms in Taiwan will inevitably strengthen their competitive ability

1. Optoelectronics elements industry: LED backlight module applications will remain the primary driver of market close, while LED lighting applications will flourish in 2011. Emerging applications such as micro-projectors and tablet PCs are currently attracting great attention, and may drive continued growth of the LED elements market.
2. Printed circuit board industry: As the world continues to gradually emerge from the past recession and consumer confidence recovers, the output of the printed circuit board industry will rise steadily.
3. Passive elements industry: Smart phones and tablet PCs are stimulating demand for passive elements, and the emergence of new applications such as LED lighting and new energy will also drive the ongoing growth of the passive elements market.
4. Switching elements industry: The chief drivers of this industry include intelligent terminals such as smart phones, Tablet PCs, smart TVs, and movement-sensing game machines, as well as other emerging markets.
5. Energy elements industry: Applications products such as mobile devices and notebook computer have enjoyed double-digit growth in recent years.