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Nanocomposites

US Industry Study with Forecasts for **2011, 2016 & 2025**

Study #2303 | February 2008 | \$4500 | 248 pages



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Rapid growth will be fueled by declining prices of nanomaterials and composites as production levels increase, and by the hurdling of technical issues concerning additive dispersion.

US demand to more than double by 2011

Although the hype surrounding polymer nanocomposites has been in full throttle for over a decade, so far the market for these new materials has been relatively slow to develop. However, as commercial interest has moved beyond pilot programs and niche applications, it appears that nanocomposites are finally ready for a breakthrough in markets such as motor vehicles and packaging. By 2011, nanocomposites demand will more than double, reaching 300 million pounds. Growth will be fueled by declining prices of nanomaterials and composites, as production levels increase and more companies enter the industry. Additionally, demand will benefit as technical issues concerning additive dispersion are overcome. By 2025, it is expected that nanocomposites will be a \$9.5 billion market, with volumes nearing five billion pounds.

Higher-priced resins to see fastest near term gains

While thermoplastics currently comprise virtually all demand for nanocomposites, compounds based on thermoset resins will eventually become a substantial part of the market, accounting for 20 percent of demand in 2025. Over the near term, the most rapid gains will be seen in higher-priced resins such as engineering plastics, in applications where the additional cost of nanomaterials is not as critical a factor. Looking forward, how-



ever, nanocomposites based on commodity plastics, such as polypropylene, polyethylene and PVC, will become more important products. Among thermosets, nanocomposites will make the strongest impact as enhancements for reinforced polyester and epoxy resins, as well as conductive thermoset molding compounds.

Packaging and motor vehicles have been two key early markets for nanocomposites, and will continue to account for nearly half of total demand in 2011. In packaging, nanoclay-based composites have found commercial success in barrier applications such as beer bottles and food containers. Clay nanocomposites have penetrated a number of motor

vehicle exterior and interior applications, while nanotube composites are becoming more widely used for static dissipation and electrostatic painting of motor vehicle parts. By 2025, the electrical and electronics market will gain in prominence, as nanotube-based composites will find use in numerous applications as a substitute for other conductive materials. Construction will also emerge as a significant market, as nanocomposites begin to replace fiber-reinforced plastics in a number of applications. Consumer markets for nanocomposites -- which are currently limited to high-end sporting equipment -- will also expand as material prices continue to decline.

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Sample Text, Table & Chart

PRODUCTS

Unsaturated Polyester

Demand for unsaturated (thermoset) polyester nanocomposites is projected to increase significantly in 2011. Beyond 2011, demand for unsaturated polyester is expected to register a steady growth, reaching 1.5 billion pounds by 2025, as they find growing applications in construction, marine, and automotive applications. Fuel efficiency will be the increased demand for composites as replacement for traditional glass fiber. However, the cost of unsaturated polyester resins will be a major barrier to the widespread use of these composites until the costs of nanomaterials and processing come down.

Unsaturated polyester, including vinyl ester resin, is used extensively in fiber-reinforced composites. Reinforced polyester has high strength-to-weight ratios, good weathering properties, high stability and abrasion and corrosion resistance. Applications for conventional polyester composites include boat hulls, storage tanks, tub and shower enclosures, motor vehicle body components, ductwork, electrical components, appliance housings and other parts, tool handles, pump housings, building panels and pipe.

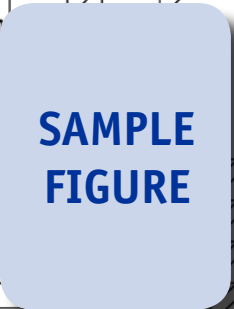
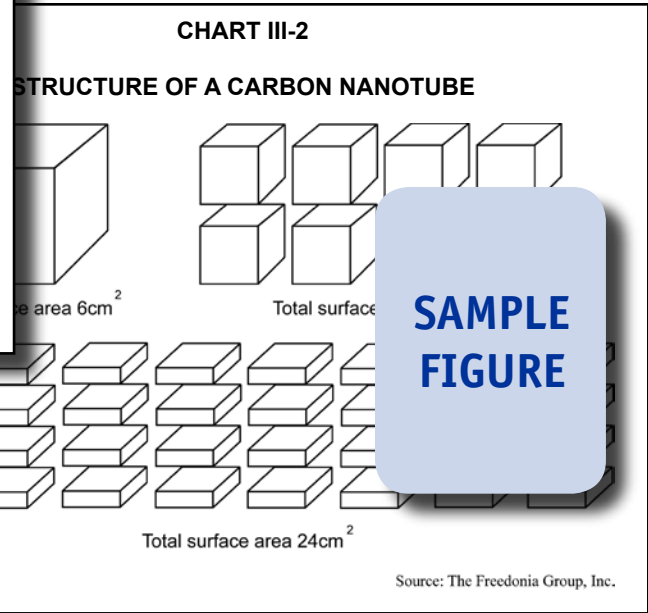
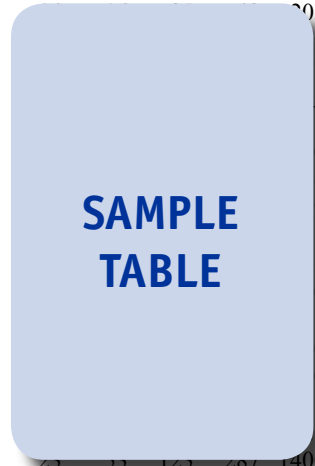
Nanocomposites provide excellent opportunities to improve performance and lower the cost of unsaturated polyester composites in almost all glass fiber-reinforced applications. While glass fiber loadings in traditional polyester composites average around 35 percent, nanoclays can provide similar mechanical strength at loadings as low as five percent. The weight reduction offered by nanocomposites is especially important for motor vehicle parts, where fuel efficiency is a key consideration. Additionally, nanoclays provide good thermal and chemical resistance, as well as added flame retardant properties. Nanocomposites are expected to penetrate a significant portion of reinforced thermoset polyester

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TABLE VI-4
MINERAL NANOMATERIALS DEMAND IN COMPOSITES
 (million pounds)

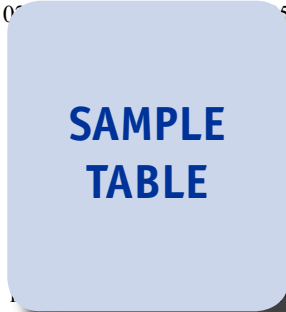
Item	2001	2006	2011	2016	2025
Nanomaterials Demand	205	350	500	650	800
% minerals	1	1	1	1	1
Mineral Nanomaterials Demand	5	5	5	5	5
By Type:					
Oxides	0	0	0	0	0
Calcium Carbonate	6	6	6	6	6
Talc & Other	9	9	9	9	9
By Resin:					
Thermoplastics	5	5	5	5	5
Thermosets	0	0	0	0	0
\$/lb	0	0	0	0	0
Mineral Nanomaterials (mil \$)	0	0	0	0	0
% minerals	6	6	6	6	6
Nanocomposites Demand (mil \$)	23	33	43	53	63



Sample Profile, Table & Forecast

TABLE V-2
PACKAGING MARKET FOR NANOCOMPOSITES
 (million pounds)

Item	2001	2006	2011	2016	2025
Packaging Shipments (bil 2000\$)	107	110	113	116	120
lb compound/000\$ pkg					5.0
Compounds in Packaging (bil lb)					1.1
% nanocomposites					0.6
Nanocomposites Demand					50
Electronics					40
Food					10
Beer Bottles					00
Medical & Pharmaceutical					60
Soft Drinks	neg	neg	2	15	130
Other	neg	neg	3	15	110



COMPANY PROFILES

Hyperion Catalysis International Incorporated
 38 Smith Place
 Cambridge, MA 02138
 617-354-9678
 http://www.hyperion.com

Annual Sales: (2008)
 Employment: (2008)

Key Products: composite masterbatches and compounds

Hyperion Catalysis is a world leader in carbon nanotube development and commercialization. The privately held company's carbon nanotubes can serve as electrically conductive plastic additives in a wide range of applications. In addition, Hyperion uses these nanomaterials in the manufacture of nanocomposite masterbatches and compounds.

The Company participates in the US nanocomposite industry primarily through the production of vapor-grown, multi-wall carbon nanotubes, which are sold under the FIBRIL brand name. FIBRIL nanotubes are made from high-purity, low molecular weight hydrocarbons in a proprietary, continuous gas phase catalyzed reaction. These nanotubes feature outside diameters of approximately 10 nanometers and lengths of over 10 microns. FIBRIL nanotubes are manufactured in intertwined, agglomerate states, but Hyperion has the capability of using proprietary techniques to disperse the nanotubes. The Company's FIBRIL nanotubes are suitable for use in the commercial production of high-performance conductive plastics. Specific products from Hyperion include FIBRIL nanotube-based masterbatches and ready-to-mold compounds.

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“Demand for nanocomposites in soft drink packaging applications is expected to soar from an extremely small current base to 130 million pounds by 2025. Soft drinks constitute a much larger overall market for plastic containers than any other beverage type. In addition, the nature of carbonated soft drinks is such that gas barrier property requirements are especially stringent, so that the beverage maintains as much of its original flavor and effervescence for as long as possible. As a result...”

--Section V, pg. 104

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OTHER STUDIES

World Nanomaterials

The global market for nanomaterials will reach \$4.2 billion by 2011 and remain concentrated in the US, Western Europe and Japan. Products making the greatest initial commercial impact are nanoscale versions of conventional materials such as silica, titanium dioxide, alumina, iron oxide, and zinc oxide. This study analyzes the \$1 billion global nanomaterials industry, with forecasts for 2011, 2016 and 2025 by product, market, world region and for 15 countries. It also discusses R&D and profiles major participants.
 #2215 08/2007..... \$5500

Nanotechnology in Construction

US demand for nanomaterials in construction will reach \$100 million in 2011, and leap to \$1.75 billion by 2025. Coatings will be the largest application, followed by composites and concrete additives. Nanoscale silica, titanium dioxide, and clay will post substantial gains. This study analyzes the US market for nanomaterials in construction, with forecasts for 2011, 2016 and 2025 presented by product, application and market. It also considers market environment factors and profiles leading industry players.
 #2185 05/2007..... \$4500

Industrial Crystals

US industrial crystal demand will grow 5.8% yearly through 2011, led by uses in nonlinear optical materials and compound semiconductor substrates. Communications and security/defense will see the largest market gains. Transition metal-based crystals and semiconducting types will be the fastest growing materials. This study analyzes the \$845 million US industrial crystal industry, with forecasts for 2011 and 2016 by material, application and market. It also evaluates market share and profiles leading players.
 #2166 05/2007..... \$4500

Nanotechnology in Health Care

US demand for nanotechnology medical products will grow 17.5% annually through 2011, driven by the critical need for new or improved therapies and diagnostics. The greatest short-term impact will be in cancer and central nervous system disorders, followed by orthopedic nanoimplants. This study analyzes the \$23.6 billion US nanotech medical product industry to 2011, 2016 and 2021 by material, product and application. The study also reviews product development activities and profiles major players.
 #2168 02/2007..... \$4500

Advanced Ceramics

US advanced ceramics demand will grow 7% annually through 2010. Electronic components and electrical equipment will remain dominant but mature markets. The best opportunities for ceramics include ballistic armor, ceramic composite automotive brakes, diesel particulate filters, joint replacement products and piezoceramic sensors. This study analyzes the \$8.6 billion US advanced ceramics industry for 2010 and 2015 by type, product and market. It also details company market share and profiles major producers.
 #2134 12/2006..... \$4400

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