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# Natural Polymers

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US Industry Study with Forecasts for **2012 & 2017**

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Study #2422 | November 2008 | \$4600 | 296 pages

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*Best opportunities within the key cellulose ether natural polymer segment are anticipated for microcrystalline cellulose (MCC), particularly in pharmaceutical tablet filling and binding.*

## US demand to grow 7.1% annually through 2012

Natural polymer demand is expected to grow 7.1 percent annually to \$4.0 billion in 2012, or 1.75 billion pounds. Best opportunities are anticipated in packaging areas as a result of the increased availability and cost competitiveness of novel polymers such as polylactic acid (PLA). Further growth will be threatened by climatic and political uncertainties for products such as guar gum and gum arabic, as well as competition from synthetic alternatives.

## Starch, fermentation types to grow at rapid pace

Cellulose ether demand is expected to rise 4.2 percent annually through 2012, accounting for about one-third of all natural polymer demand. Methyl cellulose will dominate the cellulose ether market due to its widespread use in construction materials such as plaster, mortar, grouts, stucco and wallpaper pastes. Best cellulose ether opportunities are anticipated for microcrystalline cellulose (MCC), particularly in pharmaceuticals. MCC has quality and performance advantages in tablet filling, and binding uses, including good compaction under low compression pressure.

Demand for starch and fermentation products will expand at a double-digit pace through 2012 based on greater availability and improved production technologies for polymers such as PLA, starch blends and hyaluronic acid.



Falling prices will also boost volume demand. Polylactic acid will see significant growth in packaging areas such as thermoformed containers. Hyaluronic acid demand will be stimulated by an aging populace, generating strong demand for dermal injections and orthopedic treatments.

Robust growth is anticipated for protein-based polymers such as collagen, with further advances threatened by competition from longer-lasting alternatives such as hyaluronic acid. Exudate and vegetable gum demand will be bolstered by opportunities for guar gum in food and beverage applications. Good opportunities are anticipated for marine polymers such as carrageenan and alginates,

mainly in food and beverages, and wound dressings.

## Packaging, medical markets offer best opportunities

Although packaging will be the fastest growing market, medical markets will experience good growth through 2012 based on widespread applications for materials such as cellulose ethers as well as high priced collagen and hyaluronic acid used as fillers, topical treatments and injections for the treating of osteoarthritis of the joints. Food and beverage markets will grow at a slower pace based on mature applications and competition from synthetic alternatives.

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## Sample Text, Table & Chart

### PRODUCTS

#### Polylactic Acid

Demand for polylactic acid (PLA) will expand at a rapid pace through 2012, reaching 1.1 million pounds. Packaging applications, although slow, will continue to grow. Growth is anticipated in medical applications, which include significant product development. Other product applications include greater processor familiarity, consumer awareness, and environmental advantages. Prices are expected to decline to \$0.84 per pound by 2012, as economies of scale and fermentation improvements. High corn prices will threaten price declines. However, increased capacity and higher efficiencies will offset this to some extent. Exports will remain particularly to Europe and Japan.

Polylactic acid, a linear aliphatic polyester, is produced by the polymerization of lactic acid, which is made by the fermentation of sugars obtained from renewable resources such as corn and sugar cane. This material has a low moisture vapor transmission rate, high clarity and good strength. PLA is a thermoplastic material that can be processed by a number of techniques such as injection molding, blow molding, extrusion and thermoforming. PLA can be made into flexible or rigid products and is inherently clear, but can be processed to be opaque. The material is compostable, biodegradable, and degrades by hydrolysis. The material can also be spun into fibers.

PLA is a completely biodegradable polymer. Prior to the early 1990s the material was too expensive to be commercially feasible for large scale applications, so its use was limited largely to specialized applications like biomedical devices, sutures and surgical implants. However, as a result of advancing biotechnology and rising conventional plastic prices, PLA has become cost competitive with conventional polyolefin and polyester resins. PLA is frequently blended with starch to

114

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SAMPLE  
TEXT

TABLE IV-12

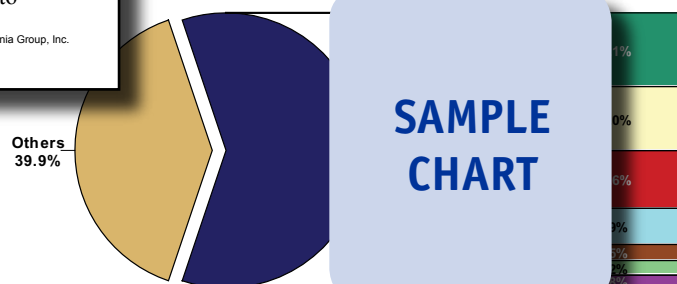
HYALURONIC ACID DEMAND  
(million dollars)

Item	1997	2002	2007	2012	2017
Pharmaceutical Shpts (bil 2000\$)	116	177	210	244	285
lbs hyaluronic/mil \$ pharm shpts	35	34	52	82	112
Hyaluronic Acid (000 lbs)					32
\$/lb					6
Hyaluronic Acid					1
Medical -- Orthopedic Injections					5
Cosmetics & Toiletries:					6
Dermal Fillers					3
Topical Fillers					3
% hyaluronic acid					9
Fermentation Product Demand					0

SAMPLE  
TABLE

CHART V-1

AL POLYMER MARKET SHARE BY COMPANY, 2007  
(\$2.9 billion)



SAMPLE  
CHART

## Sample Profile, Table & Forecast

### COMPANY PROFILES

Cereplast Incorporated  
 3421-3433 West El Segundo Boulevard  
 Hawthorne, CA 90250  
 310-676-5000  
 http://www.cereplast.com

Revenues: \$  
 Employment:

Key Products:  
 tic forks, kn  
 these resins

**SAMPLE  
PROFILE**

Cereplast is engaged primarily in the development, manufacture and sale of biologically based resins for use in blown film, injection molding, thermoforming, blow molding, extrusion and other conventional converting processes. In addition, the Company markets finished products made from its resins.

The Company is involved in the US natural polymer industry primarily through the production of CEREPLAST COMPOSTABLES biodegradable/ compostable resins, which are made from polylactic acid (PLA), starches and other renewable resources. The PLA used in Cereplast's resin manufacturing operations is NATUREWORKS PLA, a product supplied to the Company by NatureWorks LLC (Minneapolis, Minnesota), a joint venture between Cargill Incorporated (Wayzata, Minnesota) and Teijin Limited (Japan), under the terms of a long-term supply agreement. CEREPLAST COMPOSTABLES resins are designed to serve as environmentally friendly alternatives to conventional plastics in the converting and production processes of the foodservice, graphic arts, packaging, durable goods and other industries. For example, Cereplast utilizes CEREPLAST COMPOSTABLES resins to

TABLE III-3

### MEDICAL DEMAND FOR NATURAL POLYMERS BY APPLICATION & PRODUCT (million dollars)

Item	1997	2002	2007	2012	2017
Pharmaceutical Shpts (bil 2000\$)	1	1	1	1	1
lb polymer/000\$ pharm shpts	0	0	0	0	0
Natural Polymer Demand (mil lb)					
\$/lb	2	2	2	2	2
Natural Polymer Medical Market					
By Application:					
Pharmaceuticals					
Orthopedic Injections					
Wound Care					
Other					
By Product:					
Starch & Fermentation					
Cellulose Ethers					
Protein-Based					
Marine Polymers					
Other					

**SAMPLE  
TABLE**

"Demand for natural polymers in the manufacture of cosmetics and toiletries is expected to rise 6.9 percent annually to \$275 million in 2012, reaching 115 million pounds. Good opportunities are anticipated for hyaluronic acid and collagen, fueled by an aging populace and higher disposable personal income levels. Further gains will be threatened by ..."

--Section III, pg. 66

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**OTHER STUDIES**

**Specialty Films**

This study analyzes the US specialty film industry. It presents historical demand data for 1997, 2002 and 2007 and forecasts to 2012 and 2017 by film type (e.g., polyolefin, polyvinyl chloride, polyester, polyvinyl butyral, nylon, polyvinylidene chloride, ethylene vinyl alcohol, polyimide), function (e.g., barrier, decorative, breathable, safety and security, conductive, light control, biodegradable, water soluble) and market. The study also considers market environment factors, evaluates market share and profiles industry players.

#2452 ..... 01/2009..... \$4700

**World Pressure Sensitive Tapes**

This study analyzes the global pressure sensitive adhesive (PSA) tape industry. It presents historical demand data (1997, 2002, 2007) and forecasts for 2012 and 2017 by product type (e.g., carton sealing, masking, electrical and electronic, double-sided, medical), backing material (e.g., polypropylene, PVC, paper), raw material, world region and major country. The study also considers market environment factors, details industry structure, evaluates company market share and profiles industry competitors.

#2451 ..... 01/2009..... \$5800

**Cosmeceuticals**

Demand for cosmeceuticals in the US will increase 7.4% annually through 2012, driven by an aging population seeking to maintain the appearance of youth. Antioxidants will remain the largest chemical category while botanicals and enzymes stay among the best opportunities. Injectables and skin care products will register the fastest growth. This study analyzes the \$5.8 billion US cosmeceutical industry, with forecasts for 2012 and 2017 by product and chemical. It also evaluates market share and profiles major players.

#2413 ..... 10/2008..... \$4700

**Biodegradable Plastic**

US demand for biodegradable plastic will grow 15.5% yearly through 2012. Gains will be driven by escalating costs for petroleum-based resins and growing initiatives that favor renewable resources. Polyester-based and polylactic acid resins will grow the fastest, while starch-based types remain the largest segment. This study analyzes the 350 million pound US biodegradable plastic industry, with forecasts for 2012 and 2017 by type and market. It also details market share and profiles industry players.

#2387 ..... 08/2008..... \$4600

**Pharmaceutical Packaging**

US demand for pharmaceutical packaging will grow 5.5% annually through 2012. Strong growth is forecast for value-added types, especially parenteral vials and flip-top closures, plastic dispensing bottles and closures, prefilled inhalers and syringes, parenteral stoppers, track and trace and authentication labels, and unit dose pouches. This study analyzes the \$12.2 billion US drug packaging industry, with forecasts for 2012 and 2017 by material, product and market. It also evaluates market share and profiles industry players.

#2341 ..... 05/2008..... \$4700

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