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Georgia Tech's Renewable Bioproducts Institute Receives \$43.6 Million in Legacy Funding

Editor's Note: The following article is reprinted, with permission, from the June 11, 2014 issue of the Georgia Tech Daily Digest.

The Georgia Institute of Technology has received a \$43.6 million gift from the Institute of Paper Chemistry Foundation (IPCF). This major grant, one of the single largest gifts in Georgia Tech's history, affirms the Institute's position as a leading driver of the future of the forest bioproducts industry.

"We are extremely grateful to the Institute of Paper Chemistry Foundation for entrusting us with this generous gift," said Georgia Tech President G.P. "Bud" Peterson. "Through the Renewable Bioproducts Institute, we will maximize Georgia Tech's and the state of Georgia's strengths in sustainability and innovation to develop real-world applications as well as educate the next generation of leadership in the forest and bioproducts industry."

The Institute of Paper Chemistry Foundation represents the legacy of the Institute of Paper Chemistry (IPC), founded in Appleton, Wisconsin, in 1929 to provide scientific research and future leaders for the paper industry. IPC became the Institute of Paper Science and Technology (IPST) when it relocated to Atlanta in 1989. It subsequently merged with Georgia Tech in 2004.

Last week, Georgia Tech announced that the Institute would be renamed the Renewable Bioproducts Institute (RBI) to reflect its expanding engagement with a broader range of biomaterials processing industries. Like the university's other nine interdisciplinary research institutes representing Georgia Tech's core research areas, RBI brings together a multidisciplinary capability to identify opportunities and address the

complex challenges of its industry and government research partners.

"We believe the relaunching of the Institute as the Renewable Bioproducts Institute is a natural development in its evolution and an important advance in its progress," said IPCF board chair George Lanier. "Georgia Tech is demonstrating its commitment to this industry, which is so important to Georgia and the nation. The industry's emerging opportunities can be effectively developed there."

All interdisciplinary research institutes at Georgia Tech are designed to facilitate research collaborations with industries and other partners to develop opportunities in strategic market areas, emphasizing economic development and applied technology.

"We deeply appreciate the confidence IPCF has placed in us," said RBI executive director Norman Marsolan, "and we will continue its legacy of growth in bioproducts research and industry leadership development. We are on the threshold of a new era of development of this renewable, sustainable natural resource, and we pledge our efforts to justify IPCF's faith in us by contributing to the full realization of its potential."

The Renewable Bioproducts Institute benefits from a significant endowment originating with the Institute of Paper Chemistry. That endowment has contributed to the support of more than 1,500 graduate alumni through the years and currently supports more than 50 paper science and engineering students who advance the research mission of IPST/RBI through their faculty-directed research. RBI will continue to build on that legacy by working closely with industrial partners to foster an innovative, competitive and profitable bioproducts industry, while the endowment will continue to support graduate studies in paper science and engineering.

For more information on RBI, please visit <http://www.news.gatech.edu/features/renewable-bioproducts-institute>.

Trend Indicators from Industry Intelligence Inc.

[Industry Intelligence Inc.](http://www.industryintel.com) has provided market intelligence to more than 600 companies worldwide since it began as Forestweb in 1999. Industry Intelligence delivers a daily report featuring news of the paper and forest products industries. For your subscription visit: <http://www.industryintel.com>

Below is a small sampling of recent Industry Intelligence headlines, chosen to mirror significant trends in and around the paper and forest products industries.

Tranlin says its planned US\$2B pulp, paper and fertilizer operation in Virginia will use its proprietary technology to make paper products using 100% agricultural field waste, use black liquor to produce humus-based organic fertilizer for farming

Tranlin, Inc., the newly-formed U.S. subsidiary of a leading Chinese pulp and paper company, will use the company's innovative, proprietary technology to produce tree-free, non-chlorine bleached, 100% straw paper products made exclusively from organic agricultural field waste such as wheat straw and corn stalks. In addition, the new facility will convert residuals from its process into humus-based organic fertilizer.

Norwegian forestry cooperative Viken Skog's Treklyngen unit, Arbaflame to begin producing bio-coal at old Norske Skog paper mill in Follum, Norway; plant will be able to produce up to 200,000 tonnes/year of bio-coal

Bio-coal can replace conventional coals at power plants.

Stora Enso selects Pöyry for engineering, site services for project at Varkaus, Finland, mill, consisting of rebuild of pulp mill, conversion of uncoated fine paper machine to kraftliner, upgrade of existing utilities, also detail, civil engineering

Following the conversion into a board machine, Varkaus Mill's capacity will be about 390 000 tonnes per year of kraftliner and white top liner and 310 000 tonnes of unbleached kraft pulp.

Wisconsin's coated paper industry in turmoil, with additional paper mill closures and further consolidation expected; Verso's acquisition of NewPage seems inevitable, while Appleton Coated

CEO says buyer should be announced in as soon as three months

As described in an article in the Jun 9, 2014 edition of the Milwaukee Journal Sentinel, the Wisconsin pulp and paper industry faces looming ownership changes that pose a threat to the existence of at least some paper mills in and near Wisconsin. Verso Paper Corp. has announced it wants to acquire NewPage Holdings Inc. in a deal that would combine the two biggest coated paper producers in North America -- raising questions about what the merged company would do with its new excess capacity.

IP starts search for new CEO; John Faraci, who has led the company since 2003 and oversaw its successful transition during that time, will retire as of March 1 due to IP's policy setting mandatory retirement at age 65

During Faraci's tenure, IP sold facilities that produce coated papers, food and beverage packaging, and wood products. This shrank the company by about one-third, Faraci said in an interview with the Memphis Business Journal late in 2013. In recent years, IP has transitioned to a company that is not "bigger-is better," said Faraci in the 2013 interview, noting that the focus was to become "profitable at a higher level and generate a lot of cash."

US corrugated container industry reduces GHG emissions 32% over 2006-2010 and improves other environmental impact indicators, such as 22% lower nutrient releases on receiving waters and soils, 14% cut in effects of particulate matter emissions

A peer-reviewed life cycle assessment study commissioned by the Corrugated Packaging Alliance and conducted by the National Council for Air and Stream Improvement measures the environmental impacts of corrugated product manufactured in 2010 and shows substantial improvements over product manufactured in 2006.

New 1.3 million tonnes/year Montes del Plata bleached eucalyptus kraft pulp mill in Uruguay receives environmental permit and is in startup process: source

Construction of the mill had been completed in March but heavy rains had caused major problems with the effluent treating system, requiring repairs and testing before issuance of the permit.

Volume of Australia's paper and paperboard production in 2012-2013 down 5.5%, while exports of paper products reached new record high of 1.13

million tonnes, reports Australian Bureau of Agricultural and Resource Economics and Sciences

The bureau also reported that exports of roundwood and woodchips showed strong growth in the December quarter of 2013.

Banks, utilities appear to be renegeing on pledges to stop misleading environmental marketing, still charging consumers for paper bills and statements, pushing for switch to digital alternatives they claim are better for environment, says Two Sides

Two Sides, which represents the graphic communications industries, is concerned that incorrect and damaging impressions are being given out by irresponsible environmental marketing claims.

Smurfit Kappa to convert 65,000 tonnes/year containerboard PM No. 1 at its Sangüesa, Spain, mill to produce 30,000 tonnes/year machine-glazed paper, transforming mill to 100% MG paper output; project will cost €27M, be completed in 2016

The mill will thereafter be one of the world's few mills focused entirely on MG paper output.

Paper Quotes

“Over the next 10 years, we'd guess that 1 billion new consumers will enter the middle class, just in China, Russia, India, and Brazil alone. And so today we would say we serve 1.6 billion consumers. And so that's a huge new group of people that will come into range that can afford our products.” – *Tom Falk, Chairman and CEO, Kimberly-Clark Corp., on May, 29, 2014 at the Sanford C Bernstein Strategic Decisions Conference*

“And what is underway right now is a massive conversion, really driven by pressure around sustainability, that companies are switching from foam-based and plastic-based packaging to fiber-based packaging. So McDonald's has recently announced that they are converting their foam cups, primarily coffee cups from foam to paper, and you can see the sizes here. We are talking billions of units when you're talking about cups that are consumed in North America. And so the opportunity here is not only for converting business, being able to grow revenue probably on the order of somewhere between 10% and 15% a year from where they currently are as these conversions are made. But we also get an integrated value as well as we run more cup stock in our mills in North America.” – *Tim Nicholls, Sr. Vice President, Printing & Communications Papers, the Americas, International Paper Company, speaking at the June 4,*

2014 Deutsche Bank Global Industrials and Basic Materials Conference

Technology for the Nontechnical: Pulp Bleaching

As described in earlier articles, cooked wood chips disintegrate upon emerging from the kraft digester, being thus transformed into pulp. After being washed to remove spent pulping chemicals and the organic byproducts of the pulping reactions, the pulp remains a very dark brown color. In some cases, the pulp is used without further treatment, for example when the final product is linerboard for corrugated containers.

If, however, it is to be converted to white paper, it must be bleached. In this context, bleaching is equivalent to removal of residual lignin, the dark-colored component of the unbleached pulp that is responsible for its color. This process is called delignification and it is accomplished in a multistage process.

The first stage is often oxygen delignification, in which the pulp is treated with alkali and oxygen under pressure. Only about half of the residual lignin can be removed in this stage; attempting to remove more would result in weakening of the pulp's fibers. The next stage is treatment with an oxidizing agent that renders the lignin susceptible to removal in a subsequent alkali (“caustic extraction”) stage. The oxidizing agent of choice is chlorine dioxide, which selectively renders most of the remaining lignin soluble in the following caustic extraction stage without forming harmful by products. (In an earlier era, chlorine was used in this stage; its use was discontinued when it was recognized that it produced effluents containing chemicals such as dioxins and chlorinated phenols that were potentially harmful to the environment.) Pulp emerging from the subsequent caustic extraction stage still contains a small amount of colored residual lignin, most of which is removed in an additional chlorine dioxide stage

A conventional “shorthand” for identifying a sequence of bleaching stages uses single capital letters, one for each stage: O for oxxygen, D for clhlorine dioxide, E for caustic extraction, etc. Accordingly, The sequence described above is the ODED sequence. Other possible sequences may include Z (ozone), or P (hydrogen peroxide) stages.

Statistics Corner: Performance of Some Fortune 500 Companies

The table below shows performance metrics of a few companies that have some degree of relevance to the paper industry. Using only these metrics, International Paper is the strongest performer among companies

whose primary products are directly paper- or forest-related. Other strong performers in the forest products arena were Rock-Tenn, Weyerhaeuser, Domtar and MeadWestvaco. Strong performers with paper products in their portfolios included P&G and K-C.■

Table 1. Performance in 2013 of Selected Fortune 500 Companies

Company	Revenues, \$ millions	Revenues Rank among Fortune 500	Profits, \$ millions	% Change in Profits from 2012	Profits as % of Revenues
Wal-Mart Stores	476,294	1	16,022	(5.7)	3
Exxon Mobil	407,666	2	32,580	(27.4)	8
Procter & Gamble	84,167	31	11,312	5.2	13
Dow Chemical	57,080	48	4,787	305	8
DuPont	36,475	86	4,848	73.9	13
International Paper	29,080	105	1,395	75.7	5
Kimberly-Clark	21,152	139	2,142	22.4	10
R.R. Donnelley & Sons	10,480	268	211	-	2
Air Products and Chemicals	10,233	276	994	(14.8)	10
Rock-Tenn	9,545	293	727	192.0	8
Weyerhaeuser	8,529	320	563	46.2	7
MeadWestvaco	5,543	457	839	309.3	15
Domtar	5,391	469	91	(47.1)	2
Gannett	5,161	481	389	(8.4)	8
Black – Revenue leaders					
Red – Pulp and paper producers and/or converters					
Blue – Printers or publishers					
Green – Suppliers to the pulp and paper industry					

(Source: Fortune magazine)