



Biobased, Sustainable, Biodegradable



Introducing Mirel™

Good for the earth. Great for your brand.

Mirel™ is a new family of biobased, biodegradable and compostable bioplastics, produced from corn, that are environmentally responsible alternatives to petroleum based plastics.

By combining bioscience and nature, Mirel offers a responsible solution for the global environment and a profitable opportunity for brand owners.

From Nature

Biobased

Mirel is produced through a patented process in which a renewable agricultural feedstock (corn sugar) is transformed into high performance polymers.

Sustainable

Consumers are increasingly concerned with environmental health, climate change and the growing burden on waste disposal systems around the world. This is generating demand for brand owners, retailers and manufacturers to provide packaging and consumer products that are sourced responsibly, designed to be effective and safe, and which reduce environmental impact. Mirel reduces the use of petroleum and GHG emissions versus traditional plastic. An independent LCA (2007) on the major building block for Mirel indicated that Mirel is greenhouse gas neutral and that there is a potential 95% reduction in petroleum usage when compared to conventional plastics. We intend to commission further cradle-to-grave analyses

on Mirel which, when completed, will provide more specific data regarding the benefits of Mirel to our customers.

Biodegradable

Mirel biodegrades in a wide range of environments including soil, home compost, industrial compost, salt water and fresh water lakes, rivers and streams. From its origin, Mirel is designed to fully biodegrade in diverse natural environments when disposed of properly.

Performance

Mirel is a family of high performance biobased resins that provide physical properties ranging from flexible to rigid. Mirel also has outstanding heat resistance. As a result, Mirel may replace both polyolefin and styrenic based polymers in a variety of applications.

- **Agriculture:** mulch film, stakes, erosion control, netting, sod wrap, plant pots
- **Compost Bags:** industrial can liners and consumer kitchen and yard compost bags
- **Consumer Products:** cosmetic packaging, lipstick tubes, compacts and brush applicators; gift cards, writing instruments, razors and more
- **Business Equipment:** packaging trays, structural components, lab science equipment
- **Packaging:** consumer disposable, caps, closures, shrink wrap
- **Marine/Aquatic:** erosion control, soil restoration and water treatment

Processing

Mirel can be processed on standard existing processing machinery. Following proper processing guidelines and parameters, Mirel can utilize commercial scale processing equipment resulting in productivity similar to existing petroleum based polymers. Mirel is also compatible with existing secondary processes and equipment. For example, printing, sealing and other post processes.

- Injection Molding
- Cast Sheet
- Film for Cast and Blown applications
- Thermoforming

Development grades are:

- Foam
- Non-wovens, fibers
- Monofilament
- Extrusion coating

Profitability

Environmental concerns among consumers are already driving demand for products that cause less stress on the environment. Biodegradable and compostable products are rapidly gaining shelf space and garnering higher prices with consumers. Because of this trend, brand owners are now looking for compelling ways to expand and improve their brand image and profits through product differentiation.

Creative brand owners can take advantage of Mirel's versatility and environmental benefits to enhance product marketability. That's good for the earth and great for your brand.

From Nature

Toward a Responsible Future.

Today there is a major shift towards healthier living and the natural products market sector. This marks an opportunity for creative and functional packaging solutions that promote social, economic and environmental benefits. Biodegradable biobased materials present a next generation option for many packaging and consumer products worldwide.

Mirel resins meet ASTM D6400 and EN 13432 standards for compostable plastics, and ASTM D7081 standard for biodegradable non-floating plastics in marine environments.

Test results from ASTM D5988-96 and ISO 17556 for aerobic biodegradation in soil of plastics or residual plastics materials, show that Mirel fully biodegrades at room temperature.



Test results from ASTM D5209 / ISO 14852 and ASTM D5271 / ISO 14851 for aerobic biodegradation of plastic materials in an activated-sludge-wastewater-treatment system show that Mirel fully biodegrades at room temperature.

Mirel resins have received the Vinçotte certifications of both the OK Biodegradable Soil for natural soil biodegradability and the OK Biodegradable Water for natural fresh water biodegradability.

Mirel Bioplastics

Mirel is marketed and sold through Telles™, a 50/50 joint venture between Metabolix and Archer Daniels Midland Company (ADM). ADM has begun construction of the world's first Mirel bioplastics plant located in Clinton, Iowa. This new facility will produce 110 million pounds of Mirel per year with start up scheduled for 2009.



Learn more at

www.mirelplastics.com





www.mirelplastics.com

Telles

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