

Thirty-Something Reasons Why PHA Biodegradable Plastic Matters to Families

The Argument for Replacing Plastic with MHG's *Nodax*TM PHA

By Laura Mauney

Do busy families care what plastic is made of any more than busy commuters care what kind of fuel goes into the vehicles that get people to work or school on time?



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Probably not. Most families probably care more about running smoothly from hour to hour, day to day, week to month to year.

The question becomes, then, why should families care at all about the chemical composition of plastic?

Take a quick look around the house. Look for plastic things. How

many can you list? In less than five minutes, I came up with over 30 items:

- Broom and mop
 - Carryout bags
 - Cereal box liners
 - Cleaning fluid bottles
 - Coffee maker
 - Colander
 - Comb
 - Cooking utensils
 - Egg carton
 - Electronics casings
 - Emergency water bottles
 - Filtered water dispenser + filters
 - Food storage
 - Medicine bottles and sealers
 - Milk carton caps
 - Pet food bowls
 - Pet toys
 - Pet treat bags
 - Pet waste bags
 - Sunglasses
 - Trash bags
- For families with children (mine are grown), add:*
- Baby Bottles
 - Balls, blocks and dolls
 - Diapers
 - Lunch pails

- Credit cards, rewards cards, library card, license
- Dustpan
- bags
- Food storage containers
- Juice bottles
- Juice pitcher
- Laundry basket
- Makeup bottles, tubes, compacts
- Vacuum cleaner
- Wrapping for bathroom tissue and paper towels.
- Yogurt cups
- Pacifiers
- Shoes
- Rockers, riders and swings
- Wading pools

In other Words, Plastic Plays a Tremendous Role in Modern Family Life

There are many arguments in favor of replacing most petroleum-based plastics with bioplastics. The arguments include:

- The massive amount of waste generated by single use, disposable plastic items that take hundreds of years to fully degrade;
- The risks caused by certain chemicals used to modify the properties of a given plastic, potentially toxic stuff that not only leaches into food and bodies, but into soil and water.



Appliance casings and parts made of plastic often end up in landfills

The degree of backlash against the toxicity and waste generated by petroleum-based plastic is demonstrated by [plastic bag bans](http://www.cawrecycles.org/the-problem-of-plastic-bags) (<http://www.cawrecycles.org/the-problem-of-plastic-bags>) in communities across nineteen states, not to mention the September 2014 statewide ban in California itself.

From a waste management perspective, another significant impact of petroleum-based plastic goes far beyond the landfill clutter caused by single use bags and other disposables that cannot be recycled. For many years, plastic pet waste bags and trash can liners have been used to capture and contain organic waste itself, waste that potentially can be sealed inside plastic incubators for decades rather than naturally decomposing.

With these implications in mind, the argument is no longer about whether or not petroleum-based plastic should be replaced, but rather, about how manufacturers can make the switch expediently, seamlessly, and cost effectively.

Why *Nodax*TM PHA Matters

According to Dr. Isao Noda, MHG's Chief Scientific Officer, the biodegradable plastic, *Nodax*TM PHA "can replace a large number of commodity plastics currently used in households."

Dr. Noda, a global leader in biopolymer development, originally created *Nodax*TM PHA for Procter & Gamble. The product is now being commercially produced by MHG.

For many years, the only viable substitute on the consumer market for petroleum-based plastic was bio-based PLA, often derived from cornstarch or sugar. PLA is a polyester that can be adapted to a variety of useful purposes where organic biodegradability under composting is desirable, including bottles and trays, package glues and coatings, and surgical stitches and implants.

However, the low softening temperature, narrow range of mechanical properties, and lack of UV resistance of PLA (meaning it cannot hold up under sunlight), along with its alleged impact on food crops, make it a less than perfect substitute for common household products made of petroleum-based plastic.

Cups and utensils made of PLA, for example, may wilt if put in contact with hot liquids. Additionally, off the shelf versions of cornstarch-based plastic items often cost significantly more than petro-plastic counterparts, so are thus not particularly competitive at the consumer level.



Cooking utensils made of plastic need to withstand high temperatures without leaching toxins.

MHG's *Nodax*TM PHA, by contrast, is sourced from microorganisms fed by vegetable oil. Its molecular construction enables manufacturers to overcome many of the issues associated with PLA.

PHA has a high melting temperature as compared to the softening temperature of PLA. PHA is also naturally UV resistant, giving it the kind of resilience needed to replace the majority of

petro-plastic items that are common in our everyday lives.

MHG's manufacturing method for PHA plastic additionally creates a much lower environmental impact than cornstarch-based PLA plastic. Because it is derived from locally grown Canola, a crop that can be alternated seasonally with valuable food crops, PHA should not put global food supplies and other agricultural commodities at risk. Additionally, the Canola oil is extracted mechanically, rather than chemically, and the microorganisms replicate through biosynthesis.

Such simplified production makes MHG's PHA cheaper and cleaner to make, especially in regions where local Canola farming is possible. Household products made of *Nodax*TM PHA will therefore be cost competitive with almost any item made of petroleum-based plastic.

PHA Biodegradable Plastic Expands the Application Range of Bioplastics

Says Dr. Noda, "Unlike some other PHA introduced in the past, the mechanical property of MHG's *Nodax*TM PHA can be readily adjusted from very hard and tough for such applications [toys, laundry baskets, clothespins] to flexible and very soft ones suitable for say, films, by simply adjusting the fermentation conditions of particular microorganisms used. This is indeed the major strength of our bioplastics."

Because of its flexibility, MHG's PHA can be adapted to a wide range of manufacturing processes, including extrusion, thermoforming, and injection molding, and can even be used as an additive to strengthen PLA.

PHA can be cast into sheets or blown to films to make carryout bags, food storage bags, box linings, sealing material, agricultural film, diapers, trash bags, pet waste bags, and other plastic items that require flexibility.

PHA also can be molded into objects, like beverage bottles, cups, bowls, utensils, toys, electronics casings, vacuums, coffee makers, and colanders.

Additionally, according to Dr. Noda, "MHG's *Nodax*TM PHA is well-suited for cosmetics product applications. We read a lot about the potential hazard of non-degradable micro beads made of petroleum-based plastics which are entering our environment, especially in lakes and rivers. *Nodax*TM PHA copolymers are certified as fully biodegradable in most environments, including marine and freshwater, as well as in soil and composting facilities."

Is Seamless Replacement of Petroleum Based Plastics with PHA Plastic Possible?

At this stage, eco-friendly PHA biopolymers can be almost invisibly substituted in most common plastic products, with very few plastic items *off* the list.

Says Dr. Noda, "One should not replace, for example, sewer pipes made of PVC with PHA. Likewise, it is probably not a very good idea to make furniture and bedding foam with PHA instead of polyurethane."



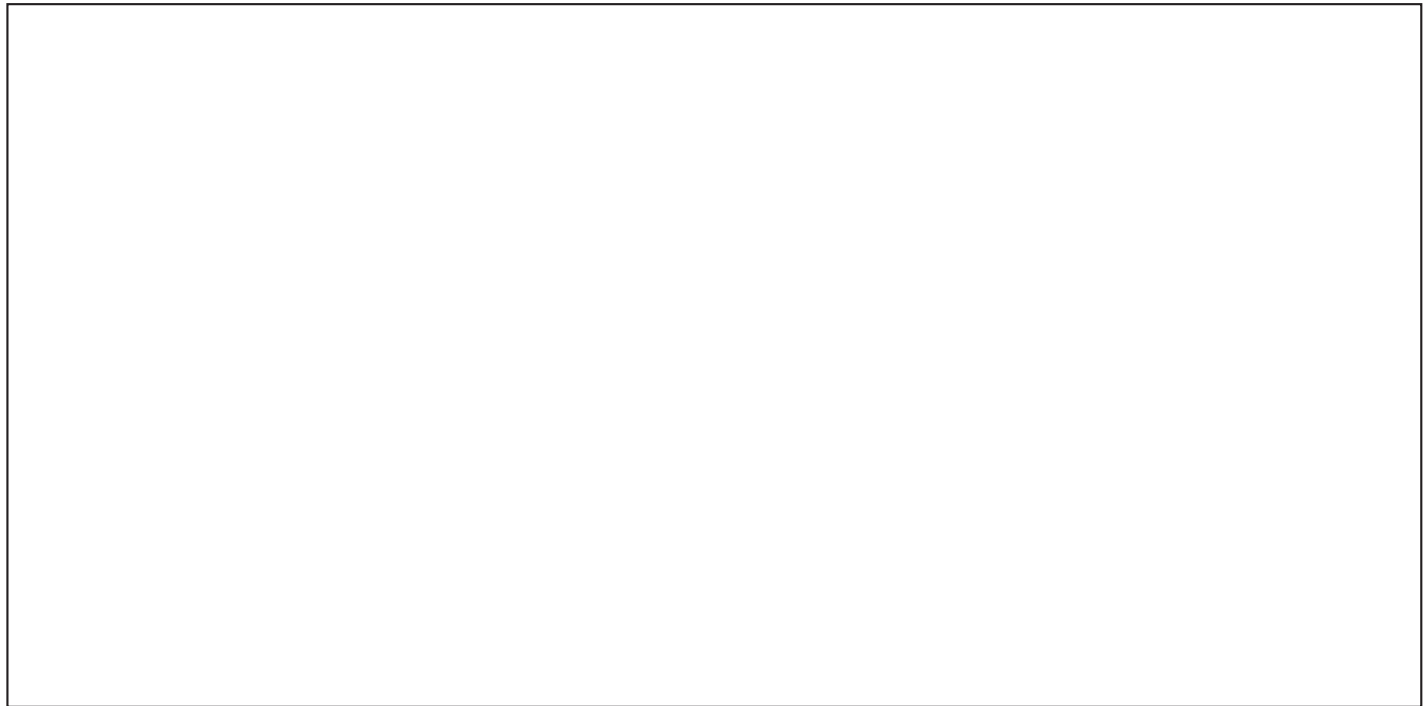
Mass production of *Nodax*TM PHA plastic is already in the works at MHG's Bainbridge, Georgia facility. From here forward, making the switch expedient and cost competitive for manufacturers is almost a given.

Does Your Company Manufacture Plastic Products?

Please visit **MHGBio.com** (<http://www.mhgbio.com/>), to find out more about how biodegradable plastics from MHG can be adapted to a wide range of product manufacturing and packaging requirements.

Learn more (<http://www.mhgbio.com/mhg-sustainability/mhg-certifications/>) about how MHG's biodegradable PHA plastic is **Certified** (<http://www.mhgbio.com/mhg-sustainability/mhg-certifications/>) for all six levels of biodegradability and compostability.

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