NJIT patent may be able to replace bisphenol A, make consumer products safer

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Michael Jaffe, a professor of biomedical engineering at NJIT, has received a patent for a chemical derived from sugar. This new material is a derivative of isosorbide and may be able to replace bisphenol A in a number of consumer products, including the lining of tin cans. Credit: NJIT

Michael Jaffe, a professor of biomedical engineering at NJIT, has received a patent for a chemical derived from sugar. This new material is a derivative of isosorbide and may be able to replace bisphenol A (BPA) in a number of consumer products, including the lining of tin cans.

Jaffe has been developing the material in conjunction with the Iowa Corn Promotion Board (ICPB) in an effort to promote and create new, commercially attractive, sustainable chemistries from wider uses of corn. This new sugar derivative can be obtained from corn. This is the first

patent in a series filed by ICPB and NJIT to develop applications and markets for sugar-based chemistry.

"Exposure to bisphenol A has been linked to health problems and we feel confident that this is a safe alternative," said Rodney Williamson, director of research and development for the board.

Much attention has recently focused on BPA, which has been known to have estrogenic properties since the 1930s. BPA is widely used in processes that result in the lining for tin cans and key ingredients in plastics ranging from baby bottles to nail polish.

Unfortunately, the chemical bonds that link BPA in polymer structures are not completely stable and the polymer may slowly decay with time, releasing small amounts of it into materials with which it comes into contact, such as food or water. Recent studies have shown the widespread presence of tiny amounts of BPA in the environment. Even at minute levels BPA may still exert estrogen-like effects on living organisms.

The new invention is an epoxy resin. These are polymers widely used as adhesives, paints and as coatings to protect food in cans. This invention describes a renewable resource epoxy, derived, for example, from isosorbide, a sustainable chemical that can be synthesized from corn starch. Both components of the epoxy—the resin and the hardener—are from water-soluble, plant-derived chemistries. The epoxy is cured by baking at an elevated temperature.

"We are viewing sugars as a chemical feedstock to produce new monomers, polymers and additives for a broad range of biomedical industrial applications," said Jaffe. "Sugar-based chemicals are attractive because they are generally regarded as safe, are a renewable resource and can be made readily available at competitive pricing.

Isosorbide offers molecular geometry and chemical functionality compatible with many existing commercial chemistries."

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