Greenlist Bulletin

From the Toxics Use Reduction Institute
at the University of Massachusetts Lowell

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In This Issue

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This is the weekly bulletin of the TURI Library at the University of Massachusetts Lowell. Greenlist Bulletin provides previews of recent publications and websites relevant to reducing the use of toxic chemicals by industries, businesses, communities, individuals and government. You are welcome to send a message to mary@turi.org if you would like more information on any of the articles listed here, or if this email is not displaying properly.

Turning Trash into Cash . . . and Saving Energy

Source: Michigan Technological University, March 4, 2013
Author: Marcia Goodrich

Suppose you could replace "Made in China" with "Made in my garage." Suppose also that every time you polished off a jug of two percent, you would be stocking up on raw material to make anything from a cell phone case and golf tees to a toy castle and a garlic press.

And, you could give yourself a gold medal for being a bona fide, recycling, polar-bear-saving rock star.

Michigan Technological University's Joshua Pearce is working on it. His main tool is open-source 3D printing, which he uses to save thousands of dollars by making everything from his lab equipment to his safety razor.

Using free software downloaded from sites like Thingiverse, which now holds over 54,000 open-source designs, 3D printers make all manner of objects by laying down thin layers of plastic in a specific pattern. While high-end printers can cost many thousands of dollars, simpler open-source units run between $250 and $500-and can be used to make parts for other 3D printers, driving the cost down ever further.

Read more...

Read original article in *Rapid Prototyping*, "Distributed recycling of waste polymer into RepRap feedstock."

Read also in the *Proceedings of the Material Research Society*, "Distributed Recycling of Post-Consumer Plastic Waste in Rural Areas."

Honda develops process to reuse rare earth metals extracted from old NiMH batteries for new NiMH batteries for hybrid vehicles

Source: Green Car Congress, March 3, 2013

Honda Motor Co., Ltd. has established what it says it is the first process to reuse rare earth metals extracted from old nickel-metal hydride (NiMH) batteries for new nickel-metal hydride batteries for use in hybrid vehicles.

Honda has been extracting an oxide containing rare earth metals from used nickel-metal hydride batteries at the plant of Japan Metals & Chemicals Co., Ltd. (JMC). . . . Now, by applying molten salt electrolysis to this oxide, Honda has succeeded in extracting metallized rare earth that can be used directly as negative-electrode materials for nickel-metal hydride batteries.

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Shark Skin Inspires Aircraft Coatings

Source: *PaintSquare*, February 27, 2013

Shark skin-inspired coatings research is underway on dry land and could soon take flight, as German airline giant Lufthansa Technik AG prepares to test the new paint system on two jets.

The novel lacquer is being applied to sections of two Airbus planes to test the durability of an aircraft surface coating that mimics shark skin under real-life flying conditions.

By altering the microstructure of the surface of an airplane, the aerodynamics can be improved, lowering the amount of energy and fuel needed, researchers said.

Read more...

Read more about Europe's Clean Sky research project.

Lignin-Based Bio-Oil Mimic as Biobased Resin for Composite Applications

Source: *ACS Sustainable Chemistry and Engineering*, February 2, 2013
Authors: Joseph F. Stanzione, Philip A. Giangiulio, Joshua M. Sadler, John J. LaScala, and Richard P. Wool

Lignin is an abundant renewable raw material that has the potential to yield valuable bio-oils consisting of aromatic chemicals when strategically depolymerized. In order to determine if lignin-based bio-oils can be utilized in the development of biobased vinyl ester resins without the need of extensive and costly separations, a methacrylated lignin-based bio-oil mimic (MBO) was generated and utilized as a low viscosity vinyl ester resin (30.3 cP at 25 °C) and as a reactive diluent in a standard commercial vinyl ester resin. MBO was comprised of phenol, guaiacols, and catechols that were methacrylated by esterification with methacrylic anhydride and a catalytic amount of 4-dimethylaminopyridine. Curing the resin produced hard transparent thermosets that possessed near complete conversion of free radical polymerizable groups as per near-infrared spectroscopy. Temperatures of maximum decomposition rate (≥400 °C) and initial decomposition temperatures (≥300 °C) were measured by means of thermo-gravimetric analysis (TGA). Glass transition temperatures ≥115 °C and storage moduli ≥2.5 GPa at 25 °C were measured by dynamic mechanical analysis (DMA). Overall, high-performance lignin-based thermosets were synthesized possessing comparable thermo-gravimetric and thermo-mechanical properties to commercial petroleum- and vinyl ester-based thermosets.

Access article here.

Early Childhood Lead Exposure and Academic Achievement: Evidence From Detroit Public Schools, 2008-2010

Source: *American Journal of Public Health*, November 21, 2012
Authors: Nanhua Zhang, PhD, Harolyn W. Baker, MPH, Margaret Tufts, MPH, Randall E. Raymond, MS, Hamisu Salihu, MD, PhD, and Michael R. Elliott, PhD

Objectives. We assessed the long-term effect of early childhood lead exposure on academic achievement in mathematics, science, and reading among elementary and junior high school children.

Methods. We linked early childhood blood lead testing surveillance data from the Detroit Department of Health and Wellness Promotion to educational testing data from the Detroit, Michigan, public

schools. We used the linked data to investigate the effect of early childhood lead exposure on academic achievement among school-aged children, both marginally and adjusted for grade level, gender, race, language, maternal education, and socioeconomic status.

Results. High blood lead levels before age 6 years were strongly associated with poor academic achievement in grades 3, 5, and 8. The odds of scoring less than proficient for those whose blood lead levels were greater than 10 micrograms per deciliter were more than twice the odds for those whose blood lead levels were less than 1 micrograms per deciliter after adjustment for potential confounders.

Conclusions. Early childhood lead exposure was negatively associated with academic achievement in elementary and junior high school, after adjusting for key potential confounders. The control of lead poisoning should focus on primary prevention of lead exposure in children and development of special education programs for students with lead poisoning.

Read more...

Please send a message to mary@turi.org if you would like more information on any of these resources. Also, please tell us what topics you are particularly interested in monitoring, and who else should see Greenlist. An online search of the TURI Library catalog can be done at http://library.turi.org for greater topic coverage.

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