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 arewelcome to send a message to jan@turi.org if you would like more information on any of the articles listed here, or if this email is not displaying properly.

Regulated nanomaterials: 2006-2009

Source: OECD, December 2011

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 34 industrialised countries in North and South America, Europe and the Asia and Pacific region, as well as the European Commission, meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international problems.

The OECD Council established the OECD Working Party on Manufactured Nanomaterials (WPMN) as a subsidiary body of the OECD Chemicals Committee in September 2006. This programme concentrates on human health and environmental safety implications of manufactured nanomaterials (limited mainly to the chemicals sector), and aims to ensure that the approach to hazard, exposure and risk assessment is of a high, science-based, and internationally harmonised standard. This programme promotes international cooperation on the human health and environmental safety of manufactured nanomaterials, and involves the safety testing and risk assessment of manufactured nanomaterials.

This document provides a snapshot of regulated nanomaterials under the regulatory frameworks of OECD member countries during 2006-2009. It summarises legislative features, information on notified nanomaterials as well as data collected for nanomaterials under the frameworks.

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Need a new material? New tool can help

Source: Massachusetts Institute of Technology, December 20, 2011

Thanks to a new online toolkit developed at MIT and the Lawrence Berkeley National Laboratory,

any researcher who needs to find a material with specific properties - whether it's to build a better mousetrap or a better battery - will now be able to do so far more easily than ever before.

Using a website called the Materials Project, it's now possible to explore an ever-growing database of more than 18,000 chemical compounds. The site's tools can quickly predict how two compounds will react with one another, what that composite's molecular structure will be, and how stable it would be at different temperatures and pressures.

The project is a direct outgrowth of MIT's Materials Genome Project, initiated in 2006 by Gerbrand Ceder, the Richard P. Simmons (1953) Professor of Materials Science and Engineering. The idea, he says, is that the site "would become the Google of material properties," making available data previously scattered in many different places, most of them not even searchable.

For example, it used to require months of work - consulting tables of data, performing calculations and carrying out precise lab tests - to create a single phase diagram showing when compounds incorporating several different elements would be solid, liquid or gas. Now, such a diagram can be generated in a matter of minutes, Ceder says.

Read more

Green matter: creepy crawlers inspire new nanomaterial

Source: PlasticsToday, December 21, 2011
Author: Karen Laird

It's biocompatible, biodegradable, and micromoldable. It is, say its inventors, twice as strong as nylon or polylactic acid (PLA), while exhibiting the strength of an aluminum alloy at half its weight. In short, Shrilk is a new bio-inspired, sci-fi sounding insectoid material promising low cost and high performance that was developed by researchers taking a leaf from nature's own book.

Natural designs have been tried and tested throughout the eons of time it has taken for these to evolve. Poor designs fall by the wayside; sustainable innovations get passed on to future generations, to be used and improved on. Today, one of the fastest growing fields in science is called "biomimicry", in which researchers look to the natural world to find inspiration for new products, and to learn how to build in ways that are more efficient, lower-cost, and environmentally friendly.

First coined by a natural sciences writer called Janine Benyus, biomimicry is all about "replicating nature's blueprint". Which is exactly what researchers Javier G. Fernandez, Ph.D. and Donald Ingber, M.D., Ph.D. at Harvard University's Wyss Institute for Biologically Inspired Engineering looked at when studying the challenge of developing a material that could provide protection without adding weight or bulk.

They saw that natural insect cuticle, such as that found in the rigid exoskeleton of arthropods - invertebrates with segmented bodies and jointed limbs, such as insects and crustaceans - not only provided protection, it also provided structure for the insect's muscles and wings. While so light that it doesn't inhibit flight, it is also so thin that it allows flexibility.

Harvard released a statement that said that "insect cuticle is a composite material consisting of layers of chitin, a polysaccharide polymer, and protein organized in a laminar, plywood-like structure. Mechanical and chemical interactions between these materials provide the cuticle with its unique mechanical and chemical properties. By studying these complex interactions and recreating this unique chemistry and laminar design in the lab, Fernandez and Ingber were able to engineer a thin, clear film that has the same composition and structure as insect cuticle."
They named the material "shrilk" because chitosan is commonly isolated from shrimp shells, while the protein used, called fibroin - comes from silk.

One of the most interesting aspects of the living insect cuticle is that it has a range of material properties that can vary from very elastic to very hard, apparently depending on water content. Remarkably, shrilk exhibits similar versatility and it can be reversibly transformed between rigid and highly flexible states by altering water content alone.

In their article, published in the online issue of Advanced Materials, Fernandez and Ingber write that, its outstanding strength and versatility, as well as its low cost and density, make shrilk an excellent candidate as a biodegradable plastic that could have great value as a replacement for existing non-degradable plastics in a wide range of consumer product application areas, including disposable bottles, trash bags, packing materials, and diapers that currently pile up in waste sites around the planet. Because chitosan and fibroin are both biocompatible, shrilk on its own or in combination with other materials or crosslinking agents may be valuable for certain medical applications, such as wound dressings and scaffolds for regenerative medicine. Finally, due to the biological origin, wide availability, and low cost of its components - shrimp shells are a waste material - shrilk represents an abundant and sustainable material that can be seamlessly integrated into the environment within several ecological cycles.

Guiyu lead contamination raises alarm

Source: Resource Recycling, December 2011

A researcher in China says that 88 percent of the blood samples taken from children in Guiyu, China clearly show lead poisoning. The findings are made more significant by their publication in the government-owned *China Daily*. China has, until recently, downplayed reports of Guiyu's e-waste hazards.

Huo Xia, a Shantou University medical college cytologicial analysis professor, visited the town in southern China and convinced parents to let her test the blood of their children for lead, according to *China Daily*. The results showed that 88 percent of the 167 children tested, all under six, had lead poisoning in 2010, a big jump from the 16 percent among 227 children tested in 2009.

The paper reports that Huo can't explain the rise of the number of children with lead poisoning between 2009 and 2010. However, a decrease occurred in 2009, with the number of children testing positive for lead poising dropping from 81.8 percent to 16 percent, which Huo attributes to global economic conditions leading to reduced volumes of electronic scrap processed in Guiyu.

Huo has analyzed the blood of about 1,000 children since 2004 and found alarming levels of lead. Some had levels of at least 13 micrograms of lead per deciliter of blood, higher than the 10 micrograms that World Health Organization says is "cause for serious concern." Many of the children, which are exposed to the toxic metal through air pollution and from dust on their parents work clothes, show signs of physical deformity, adversely-affected mental health and behavioral problems.

EPA must improve oversight of state enforcement

Source: USEPA Office of Inspector General, December 9, 2011

EPA does not administer a consistent national enforcement program. Despite efforts by the Office of Enforcement and Compliance Assurance (OECA) and the EPA regions to improve state enforcement performance, state enforcement programs frequently do not meet national goals and states do not always take necessary enforcement actions. State enforcement programs are underperforming: EPA data indicate that noncompliance is high and the level of enforcement is low. EPA does not consistently hold states accountable for meeting enforcement standards, has not set clear and consistent national benchmarks, and does not act effectively to curtail weak and inconsistent enforcement by states.

OECA has made efforts to improve state performance and oversight consistency, but EPA does not manage or allocate enforcement resources nationally to allow it to intervene in states where practices result in significantly unequal enforcement. As a result, state performance remains inconsistent across the country, providing unequal environmental benefits to the public and an unlevel playing field for regulated industries. By establishing stronger organizational structures, EPA can directly implement a national enforcement strategy that ensures all citizens have, and industries adhere to, a baseline level of environmental protection. EPA could make more effective use of its $372 million in regional enforcement full-time equivalents by directing a single national workforce instead of 10 inconsistent regional enforcement programs.

We recommend that EPA establish clear national lines of authority for enforcement that include centralized authority over resources; cancel outdated guidance and policies, and consolidate and clarify remaining enforcement policies; establish clear benchmarks for state performance; and establish a clear policy describing when and how EPA will intervene in states, and procedures to move resources to intervene decisively, when appropriate, under its escalation policy.

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You are welcome to send a message to jan@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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