Greenlist Bulletin

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

March 2, 2012

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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.

Federal agency investigating sand-blasting hazards

Source: The Baltimore Sun, February 26, 2012
Author: Timothy B. Wheeler

For years, the wastes from burning coal and producing copper have enjoyed a second life, used in sand-blasting to remove paint, rust and grime from ship's hulls, storage tanks, bridge trusses and other surfaces. Painting contractors, shipyard workers and thousands of others in Baltimore and across the country are said to use the black, gritty material called slag.

Now, though, questions have been raised about whether those who do blasting with ground-up coal or copper slag may be unwittingly exposing themselves to toxic contaminants that could damage their health.

The Occupational Safety and Health Administration says coal and copper slag contain traces of highly toxic beryllium, arsenic and other contaminants. Federal regulators are investigating whether manufacturers of the blasting grit have provided adequate notice that users could be inhaling potentially harmful substances.

"When these abrasives are used in blasting, measured exposure levels to workers could exceed OSHA permissible exposure limits," OSHA spokesman Jesse Lawder said.

Federal regulations require listing harmful substances in "material safety data sheets" which are supposed to alert employees to the risks involved with products they're dealing with in the workplace.

Area companies involved with the coal and copper slags said they follow federal rules in manufacturing and selling the material. And companies that use the slag to prepare surfaces for painting say their workers are protected with safety gear.

Read more

Regulating industrial chemicals: lessons for U.S. lawmakers from the European Union's REACH program

Source: Indiana University School of Public and Environmental Affairs, January 2012

In the United States, the chemical industry has joined environmental advocacy groups in calling for modernization of the Toxic Substances Control Act of 1976 (TSCA). Although no consensus exists on the substance of reform, there is broad interest in learning more about the European Union's experience with Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), a major reform of EU chemicals law that was adopted in 2006.

In this report, we assume, as a thought experiment, that U.S. legislators are considering whether to replicate some (or all) aspects of REACH in the United States. It is far too early to know whether REACH has produced measurable improvements in public health or the environment or even what the total costs of REACH implementation will be.

It is nonetheless feasible to assess the workability of the REACH system and brainstorm potential applications to the USA. Given what Europe has learned from the REACH experience, we suggest some refinements or modifications to REACH that are worthy of consideration by U.S. policymakers. The report is based primarily on interviews with stakeholders and government officials in the European Union.

Download the report

In what ways does lead damage the brain?

Source: Columbia University, Mailman School of Public Health, February 29, 2012

Exposure to lead wreaks havoc in the brain, with consequences that include lower IQ and reduced potential for learning. But the precise mechanism by which lead alters nerve cells in the brain has largely remained unknown.

New research led by Tomás R. Guilarte, PhD, Leon Hess Professor and Chair of Environmental Health Sciences at Columbia University Mailman School of Public Health, and post-doctoral research scientist Kirstie H. Stansfield, PhD, used high-powered fluorescent microscopy and other advanced techniques to painstakingly chart the varied ways lead inflicts its damage. They focused on signaling pathways involved in the production of brain-derived neurotropic factor, or BDNF, a chemical critical to the creation of new synapses in the hippocampus, the brain's center for memory and learning.

The study appears online in the journal *Toxicological Sciences*.

Once BDNF is produced in the nucleus, explains Dr. Stansfield, it is transported as cargo in a railroad-car-like vesicle along a track called a microtubule toward sites of release in the axon and dendritic spines. Vesicle navigation is controlled in part through activation (phosphorylation) of the huntingtin protein, which as its name suggests, was first identified through research into Huntington's disease. By looking at huntingtin expression, the researchers found that lead exposure, even in small amounts, is likely to impede or reverse the train by altering phosphorylation at a specific amino acid.

The BDNF vesicle transport slowdown is just one of a variety of ways that lead impedes BDNF's function. The researchers also explored how lead curbs production of BDNF in the cell nucleus. One factor, they say, may be a protein called methyl CpG binding protein 2, or MeCP2, which has been linked with RETT syndrome and autism spectrum disorders and acts to "silence" BDNF gene transcription.

The paper provides the first comprehensive working model of the ways by which lead exposure impairs synapse development and function. "Lead attacks the most fundamental aspect of the brain-the synapse. But by better understanding the numerous and complex ways this happens we will be better able to develop therapies that ameliorate the damage," says Dr. Guilarte.

New measuring techniques can improve efficiency, safety of nanoparticles

[Source: University of Oregon, February 28, 2012]

Using high-precision microscopy and X-ray scattering techniques, University of Oregon researchers have gained eye-opening insights into the process of applying green chemistry to nanotechnology that results in high yields, improves efficiency and dramatically reduces waste and potential negative exposure to human health or the environment.

University of Oregon chemist James E. Hutchison described his lab's recent efforts to monitor the dynamics of nanoparticles in an invited talk today at the American Physical Society's March Meeting (Feb. 27-March 2). It turns out, Hutchison said, that simply reducing the amount of gold -- the material used in his research -- in the initial stages of the process used to grow nanoparticles allows for better maintenance of the particle size.

That accomplishment, he said, has important implications. The use of lower concentrations of the precursor that forms the nanoparticles virtually eliminates the ability of nanoparticles to aggregate together and thus prevents variations of sizes of the desired end product.

"What we saw while observing the production process with small-angle X-ray scattering (SAXS) was amazing," Hutchison, said in an interview before his lecture. "We realized that it is possible to reduce the concentration of gold and allow the particles to still grow, but shutdown the coalescent, or aggregation, pathway."

He also summarized his lab's use of chemically modified grids (Smart Grids) in transmission electron microscopy to study how nanoparticles are shed from common objects such as silverware and copper jewelry -- findings that were detailed in the journal ACS Nano in October. They studied the transformation of silver nanoparticles coated on Smart Grids as well as the common objects and found that all forms produce smaller silver nanoparticles that could disperse into the environment, especially in humid air, water and light -- and likely have been doing that throughout time without any known health ramifications.

"There may be many beneficial applications to nanotechnology, but they are only beneficial if the net benefits outweigh the deleterious implications for human health and the environment," said Hutchison, who holds the Lokey-Harrington Chair in Chemistry at the University of Oregon.

These new monitoring and measuring techniques, he said, are vital to help understand what modifications are possible in the processes that grow nanoparticles for a desired product. Using green chemistry, he added, can help assure both efficiency and stability of a product, which, in turn, will lower the risk of unwanted environmental or harmful human-health consequences.

Heavy metal pollution causes severe declines in wild bees

[Source: Pensoft Publishers, February 29, 2012]

Wild bees are important pollinators and numerous studies dealing with pollination of wild plants and crops underline their vital role in ecosystems functioning. While honey bees can be easily transported to various location when needed, wild bees' presence is dependent on the availability of high quality semi-natural habitats. Some crops, such as apples and cherries, and many wild flowers are more effectively pollinated by wild bees and other insects rather than managed honey bees.

Although heavy metal pollution is recognized to be a problem affecting large parts of the European Union, studies giving insights into their effect on wild bees are scarce. Researchers from Poland and the UK have conducted a study showing a decline in wild bee communities caused by heavy metal pollution. The experiment was carried out on a number of contaminated sites along gradients of heavy metal pollution from smelters in Poland and UK.

The results clearly show that the most polluted sites had no, or only single wild bees, in artificial nests, whereas in unpolluted sites, the same nests contained 4 to 5 different species of wild bees, with up to ten individuals. Moreover, the proportion of dead bees increased with the level of heavy metal pollution, rising 20% in uncontaminated sites to 50% in sites with a high contamination.

These findings highlight the negative impact of heavy metal pollution on the population of wild bees. These results highlight the need for the careful restoration of polluted areas, ensuring that flowering vegetation does not expose wild pollinators to unnecessary risks from heavy metals. The study was published in the *Journal of Applied Ecology* and was provided within the frame of the FP7 Project STEP - 'Status and Trends of European Pollinators'.

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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