

# Greenlist Bulletin

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

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## Evaluation for Alternatives to Hexavalent Chromium Sealants

[Source: Metal Finishing, May/June 2013](#)

Authors: Gregory Morose, Dayna Lamb, Dave Pinsky, Kent Defranco, Zachary Powell, Alp Manavbasi

Polysulfide sealants containing soluble hexavalent chromium compounds are currently being used in a variety of applications in aerospace/defense manufacturing. The applications mostly involve the filling of gaps and recesses to prevent water intrusion and collection in an attempt to prevent corrosion of the base metal. These sealants are most commonly used on aluminum assemblies and are often over coated with a variety of common coating systems with hexavalent chromium-based corrosion inhibitors. Hexavalent chromium compounds are of concern because they are carcinogens, mutagens, developmental toxicants, and have high acute toxicity. . . .

For the past year, the Evaluation Team has collaborated to jointly conduct research, testing, and analysis for using hexavalent chromium-free sealants, with various hexavalent chromium-containing and hexavalent chromium-free conversion coatings and primer materials for aluminum assemblies. The objectives of this collaborative effort were as follows:

- Evaluation of existing alternatives to metal finishing applications in the aerospace/defense industry that use hexavalent chromium sealants.
- Selection of appropriate testing and evaluation criteria to evaluate the corrosion resistance of sealant materials in various applications.
- Generation of screening level data to either: 1) justify the use of DFARS-compliant alternatives; 2) support a request for a DFARS exemption on an application by application basis; or 3) provide information to make decisions regarding further testing requirements for DFARS compliance.
- Development of a working relationship with research participants as a basis for continued collaborative research for addressing the use of hazardous substances.

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TURI's Note: Also see *Products Finishing* [article](#) regarding our upcoming [Aerospace/Defense Industry Supply Chain Conference](#).

### ORNL research reveals new challenges for mercury cleanup

[Source: Oak Ridge National Laboratory, August 5, 2013](#)

OAK RIDGE, Tenn. -- More forms of mercury can be converted to deadly methylmercury than previously thought, according to a study published Sunday in *Nature Geoscience*. The discovery provides scientists with another piece of the mercury puzzle, bringing them one step closer to understanding the challenges associated with mercury cleanup.

Earlier this year, a multidisciplinary team of researchers at Oak Ridge National Laboratory discovered two key genes that are essential for microbes to convert oxidized mercury to methylmercury, a neurotoxin that can penetrate skin and at high doses affect brain and muscle tissue, causing paralysis and brain damage.

[Read more...](#)

Read study in *Nature Geoscience*, "[Oxidation and methylation of dissolved elemental mercury by anaerobic bacteria.](#)"

### Changes in silver nanoparticles exposed to human synthetic stomach fluid: Effects of particle size and surface chemistry

[Source: Science of The Total Environment, March 1, 2013](#)

Authors: Samuel K. Mwilu, Amro M. El Badawy, Karen Bradham, Clay Nelson, David Thomas, Kirk G. Scheckel, Thabet Tolaymat, Longzhou Ma, Kim R. Rogers

The significant rise in consumer products and applications utilizing the antibacterial properties of silver nanoparticles (AgNPs) has increased the possibility of human exposure. The mobility and bioavailability of AgNPs through the ingestion pathway will depend, in part, on properties such as particle size and the surface chemistries that will influence their physical and chemical reactivities during transit through the gastrointestinal tract. This study investigates the interactions between synthetic stomach fluid and AgNPs of different sizes and with different capping agents. Changes in morphology, size and chemical composition were determined during a 30 min exposure to synthetic human stomach fluid (SSF) using Absorbance Spectroscopy, High Resolution Transmission Electron and Scanning Electron Microscopy (TEM/SEM), Dynamic Light Scattering (DLS), and Nanoparticle Tracking Analysis (NTA). AgNPs exposed to SSF were found to aggregate significantly and also released ionic silver which physically associated with the particle aggregates as silver chloride. Generally, the smaller sized AgNPs (< 10 nm) showed higher rates of aggregation and physical transformation than larger particles (75 nm). Polyvinylpyrrolidone (pvp)-stabilized AgNPs prepared in house behaved differently in SSF than particles obtained from a commercial source despite having similar surface coating and size distribution characteristics.

[Read more...](#)

Also read National Resources Defense Council Staff Blog, "[GreenScreen™ hazard assessment of silver and nanosilver demonstrates what we know, what we don't, and what we'd like to know before we get too cozy with nanomaterials.](#)"

### Chemical Disasters Spark New U.S. Order

[Source: PaintSquare, August 8, 2013](#)

The U.S. is moving to crack down on chemical safety and security in the wake of a growing series of catastrophic chemical accidents, including the April plant explosion that killed 15 people in West, TX.

President Obama has signed Executive Order 13650: Improving Chemical Facility Safety and Security, which:

- Establishes a federal-level inter-agency Chemical Facility Safety and Security Working Group;

- Directs federal agencies to improve their hazard and response coordination with state, local and tribal authorities;
- Orders federal agencies to work together to develop better targeted risk and response information;
- Recommends modernizing relevant standards and information; and
- Working with all private and public chemical industry stakeholders to share best practices.

[Read more...](#)

Access Executive Order 13650 [here](#).

### Improving chemical safety: Better band-aids or systemic change?

[Source: The Pump Handle, August 8, 2013](#)

Author: Elizabeth Grossman

"If you don't understand why something is harmful, the best you can do is stay away from it," Paul Anastas said to [the author] a few years ago, explaining the basis of the United States' risk-based chemicals management policies. "We currently deal with chemical security through guns, guards and gates rather than by redesigning materials," continued Anastas, who directs Yale University's Center for Green Chemistry and Green Engineering and served as Assistant Administrator for the US Environmental Protection Agency's (EPA) Office of Research and Development from 2009 to 2012. "Protection measures against hazards can and will fail," said Anastas. "And when they fail, risk goes to the maximum."

These words from Anastas, who with John Warner is widely considered to be a founder of the field of green chemistry, came to mind on Sunday night, August 4, as news broke of a train derailment in Lawtell, Louisiana. . . .

Anastas' words also came to mind when reading President Obama's August 1, 2013 Executive Order Improving Chemical Facility Safety and Security and while listening to the debate over the Chemical Safety Improvement Act (CSIA) (S. 1009), legislation that would reform the Toxic Substances Control Act (TSCA). While both the Executive Order and the CSIA as introduced (the bill is expected to be amended before progressing further) mention safer alternatives -- the CSIA uses the word "safer" just twice in its 127 pages -- their emphasis is on reducing exposure to existing hazardous substances and, in the case of the Executive Order, on responding to emergencies involving these chemicals. . . .

Among the concerns that have been raised about the CSIA by environmental health advocates, ten state Attorneys General, legislators from 25 states, numerous legal scholars and others -- and in a California state Assembly resolution -- is how the bill would affect existing state chemicals management policies.

[Read more...](#)

Also read about how the [Massachusetts Attorney General joins 8 other states voicing opposition to the Chemical Safety Improvement Act in its current form](#).

Click [here](#) for full coverage of the Lawtell Train Derailment.

### Front-Line Worker Engagement: Greening Health Care, Improving Worker and Patient Health, and Building Better Jobs

[Source: New Solutions, Vol. 23\(2\), 2013](#)

Authors: Laura Chenven and Danielle Copeland

Frontline workers have a great deal to contribute to improving environmental sustainability of their employers and the health of workers and patients. This article discusses a national project of the Healthcare Career Advancement Program, funded by the U.S. Department of Labor to support green jobs development. Implementation was accomplished through a labor/management collaboration between union locals and 11 employers in four regions throughout the United States. The project developed and implemented a model of training and education for environmental service workers and other frontline health-care workers in hospital settings that supported systems change and built new roles for these workers. It empowered them to contribute to triple bottom line outcomes in support of People (patients, workers, the community), Planet (environmental sustainability and a lower carbon footprint), and Profit (cost savings for the institutions). In the process workers more clearly articulated their important role as a part of the healthcare team and learned how they could contribute

to improved patient and worker health and safety.

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## EPA Strengthens Chemical Assessment Process to Protect Public Health

[Source: U.S. Environmental Protection Agency, July 31, 2013](#)

WASHINGTON -- The U.S. Environmental Protection Agency (EPA) today announced changes to its Integrated Risk Information System (IRIS) Program to improve the scientific foundation of assessments, increase transparency in the program and the process and allow the agency to produce more IRIS assessments each year. IRIS is a human health assessment program that evaluates information on health effects that may result from exposure to environmental contaminants. These high quality, science-based health assessments are used to inform decisions to protect public health and the environment. . . .

Consistent with recommendations from the National Research Council, EPA will now begin releasing preliminary materials and hold a public meeting early in the assessment development process to explain the criteria for selecting studies and to ensure that critical research was not omitted. Meeting with the public earlier in the process will result in more timely opportunities for the public to provide input into the assessment and comment on the information available for each chemical assessed.

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Also read, ["EPA Selects Eight Universities to Help Improve Public Health Data and Research."](#)

## Self-healing solar cells 'channel' natural processes

[Source: North Carolina State University, August 7, 2013](#)

To understand how solar cells heal themselves, look no further than the nearest tree leaf or the back of your hand.

The "branching" vascular channels that circulate life-sustaining nutrients throughout leaves and hands serve as the inspiration for solar cells that can restore themselves efficiently and inexpensively.

In a new paper, North Carolina State University researchers Orlin Velev and Hyung-Jun Koo show that creating solar cell devices with channels that mimic organic vascular systems can effectively reinvigorate solar cells whose performance deteriorates due to degradation by the sun's ultraviolet rays. Solar cells that are based on organic systems hold the potential to be less expensive and more environmentally friendly than silicon-based solar cells, the current industry standard.

[Read more...](#)

Read original paper in *Scientific Reports*, ["Regenerable Photovoltaic Devices with a Hydrogel-Embedded Microvascular Network."](#)

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