Woodrow Wilson International Center for Scholars

News Release

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Release No. 51-05
December 20, 2005

Comprehensive Overview of Nanotechnology's Potential Workplace Health Impacts

Article Focuses Health Research Needs

WASHINGTON – The nanotechnology workforce is growing rapidly. The nanotech industry is projected to employ two million workers and have a $1 trillion impact on the global economy by 2015.

Nanotechnology is the manipulation of matter on a near-atomic scale to make new structures, new materials and devices. Today, about 80 consumer products and over 600 raw materials, intermediate components and industrial equipment items, are used by manufacturers and produced or handled by workers.

An important article in the current issue of the ***Journal of Nanoparticle Research*** gives business leaders, scientists and policymakers the most comprehensive overview of research into nanotechnology's potential worker health impacts to appear in a peer-reviewed journal.

The authors, Dr. Andrew D. Maynard, chief scientist at the Woodrow Wilson Center's Project on Emerging Nanotechnologies, and Dr. Eileen Kuempel, a senior research scientist at the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH), draw several key conclusions from their analysis of this research:

- Very few studies have so far addressed nanomaterials in the workplace.
- Current data, although limited, point towards the need to approach engineered nanomaterials with caution in an occupational setting.
- Studies in humans have shown that the deposition of nanoparticles in the lungs increases with decreasing particle size.
- The majority of published research studies challenge current mass-based risk evaluation approaches—indicating instead that the toxicity of inhaled insoluble nanomaterials rises with decreasing particle diameter (width) and increasing particle surface area.
- The very limited published data on engineered nanoaerosol emissions into the workplace indicate that airborne mass concentrations are relatively low. However, the significance of these findings to occupational health risks cannot be assessed without further information on how particle size, chemistry and structure influence toxicity.
- Methods to control airborne nanostructured particle exposure have not been characterized comprehensively at small particle diameters, although theory and limited experimental data indicate that conventional ventilation and filtration approaches should be applicable to particles a few nanometers wide and larger.

"Dealing with submicroscopic health hazards is nothing new in the workplace. Many industrial processes—like welding, smelting, and the use of diesel engines—lead to the production of airborne particles in the nanometer size range," according to Project chief scientist Dr. Maynard.

"But the unique properties—chemical, mechanical, electrical, optical, magnetic, biological—which make engineered nanomaterials desirable for commercial or medical applications, potentially pose new risks for workers. This article highlights that there is a need for more research and more information about the health risks that nanoparticles may introduce to a 21st century workplace," said Maynard.

"The paper focused on airborne nanostructured particles because occupational lung diseases continue to be an important concern in the U.S. and worldwide," noted NIOSH's Dr. Kuempel. "Although the studies of new nanomaterials are limited, the existing scientific literature on respirable particles provides a wealth of information that is relevant to understanding the potential health hazards and controlling exposures to nanoaerosols in the workplace. At the same time, there are important data gaps, such as the fate of inhaled nanoparticles beyond the lungs. We review the scientific literature and discuss these issues in the paper."

The article, "Airborne Nanostructured Particles and Occupational Health," is available publicly online (springerlink.metapress.com/link.asp?id=700q5022523342j4) from the ***Journal of Nanoparticle Research*** (2005; 7: 587-614).

The **Project on Emerging Nanotechnologies** was launched in 2005 by the **Woodrow Wilson International Center for Scholars** and **The Pew Charitable Trusts**. It is dedicated to helping business, governments, and the public anticipate and manage the possible health and environmental implications of nanotechnology.

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