Building a Nanoparticle Information Library (NIL)

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INTRODUCTION

This presentation describes the development and current status of a nanoparticle information library (NIL), available on the National Institute for Occupational Safety and Health (NIOSH) website. The NIL is an on-line searchable database of nanoparticles and their associated properties. The NIL website has been designed for use by both researchers and industrial users. It allows on-line submissions of new data for inclusion in the database, and offers users easy links for acquiring detailed information on a great variety of nanoparticles.

The NIL is intended to provide a snapshot of global activities in this new arena and will optimally grow with time, keeping pace with the rapid developments in this expanding field. It is expected that the NIL will eventually be integrated with other data sources such as surveillance and toxicology studies of nanoparticles. It is expected to become part of a global hub for sharing information and will likely impact the course of future research, especially in regards to the health and safety of workers. The presentation will summarize the development process and include a "live" on-line demonstration of the evolving NIL database, accessible on the NIOSH website.

BACKGROUND

As the field of nanotechnology grows, new types of nanoparticles are being produced routinely and it is critical that research efforts concerning potential health and safety issues keep pace with the new developments. (UK report, 2005) It has been shown that nanomaterials can enhance toxicity potential (Oberdoerster et al., 2005; Lison et al., 1997; Donaldson and Stone, 2003) and this has even led to a proposal for a new field of study – nanotoxicology (Donaldson, et al., 2004).

Due to their unique properties, worker exposure to nanoparticles is of great concern to NIOSH. Research is underway to evaluate the toxicity of various nanomaterials and to determine the risk to workers. (Kisin et al., 2005; Mercer et al., 2005). A gap in such research is that it addresses only a limited number of well known materials. NIOSH has responded to this need by creating a nanotechnology research center and funding new research to address the health and safety of nanotechnology workers. Interim NIOSH research products are available on the NIOSH website, (http://www.cdc.gov/niosh/topics/nanotech/), including the nanoparticle information library described here. The purpose of the NIL is to provide a hub for cataloging and sharing information on nanomaterials, their physical and chemical properties, and their potential health implications. The NIL is designed to stimulate the sharing of knowledge across many fields and to encourage user interactions, thus helping to further global research goals, particularly as related to the health and safety of workers.

DESIGN OF THE NIL

The content of the prototype NIL was designed around the estimated needs of prospective users. The most likely users were identified as researchers, industrial hygienists, policy makers, manufacturers and nanotechnology workers. The first version of the NIL thus comprised information including:

- Images of nanoparticles both (mostly TEM)
- Physical properties such as size, shape, structure and surface characteristics
- Chemical properties, i.e. elements and compounds comprising particles
- Origin and/or synthesis techniques
- Applications/industries if known
- Related occupations if known
- Health and safety notes including links to MSDS sheets, toxicity information, best practices for workers, etc.
- Contributor information including associated publications, e-mail addresses, links to websites, etc.

The programming of the web site and database tool was completed by Interactive Consulting under contract to NIOSH. The user interface was designed to suit the needs of a variety of users. The format was designed to make the database easy and convenient to use. The home page interface includes most recently added or highlighted nanoparticles, quick searching capacities including basic word search, search by element or structure and recent news. Nanoparticle information is linked to contributors and visa versa so that research and networking is supported. There is also an advanced search option where users can search based on elemental content, size, structure, applications and other such criteria.

The interface also allows users to contribute their own data to the NIL, and the database will continue to grow as we receive new submissions. In the prototype version, this is accomplished by filling out a form online and sending it to a NIL administrator who subsequently adds it to the database. Enhancements to this feature are planned for future versions of the NIL.

The NIL format also invites users to sign up for regular updates on new developments. It is envisioned that as the NIL progresses these updates will focus on specific areas of interest such as types of nanoparticles, specific industries, etc.

Overall, the goal of the NIL is to provide a central clearinghouse of information, including health-related data on nanoparticles. NIL is an introductory effort to begin putting some of the myriad of nanoparticle data into a database format. Our current objective is to get feedback and contributions from the public. We want to know if our approach is viable and how we might improve it to meet the needs of the site's audience.

IMPLEMENTATION

The NIL prototype resides on the NIOSH website as part of the nanotechnology topic page. As the first stage of the implementation, this early version of the NIL was posted in order to solicit feedback from potential users. Such feedback will be used to redesign and improve the NIL.

The second phase of implementation will be to focus on soliciting as many contributions (data records) as possible, in order to maximize the usefulness of the NIL. The long term plan for the NIL includes integrating it with other databases in order to optimize its potential effectiveness.

CONCLUSIONS

NIOSH has created a prototype publicly accessible web-based nanoparticle information library. We are prepared to upgrade and improve the format, function and content in response to online feedback from users who visit the site.

Please visit the site and send us your input or comments:
http://www.cdc.gov/niosh/topics/nanotech/NIL.html

Keywords: *Nanoparticle properties, Nanoinformatics, Nanotechnology, Nanoparticle Information Library*

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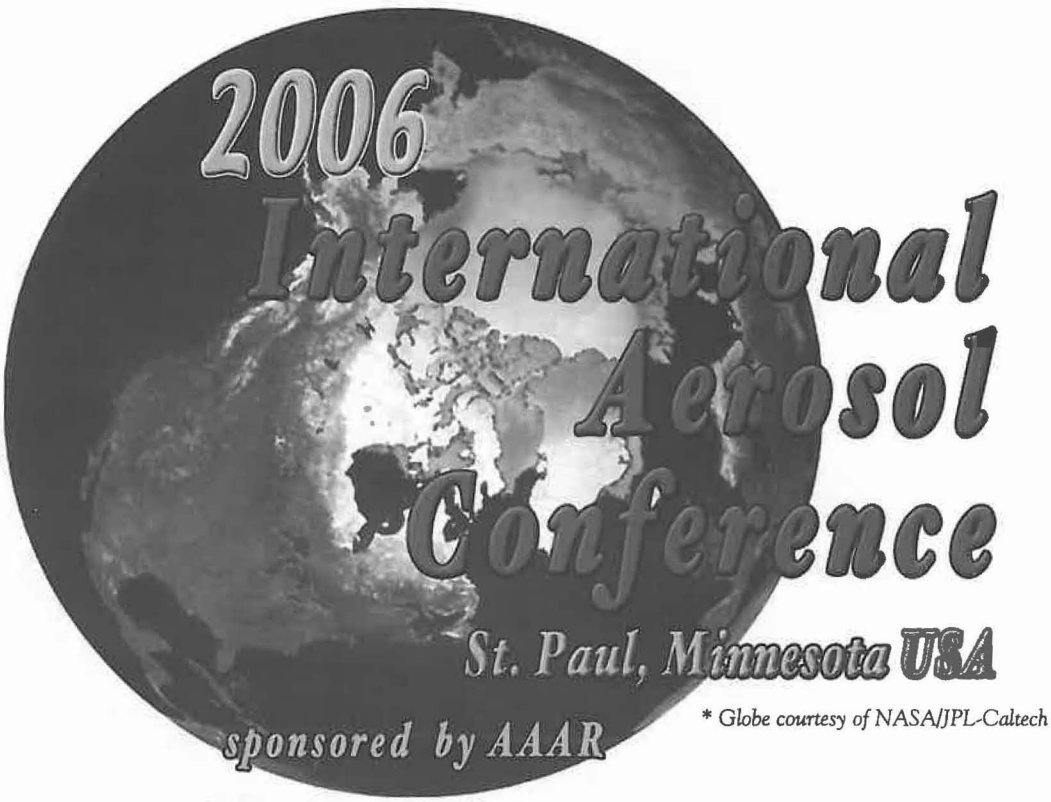

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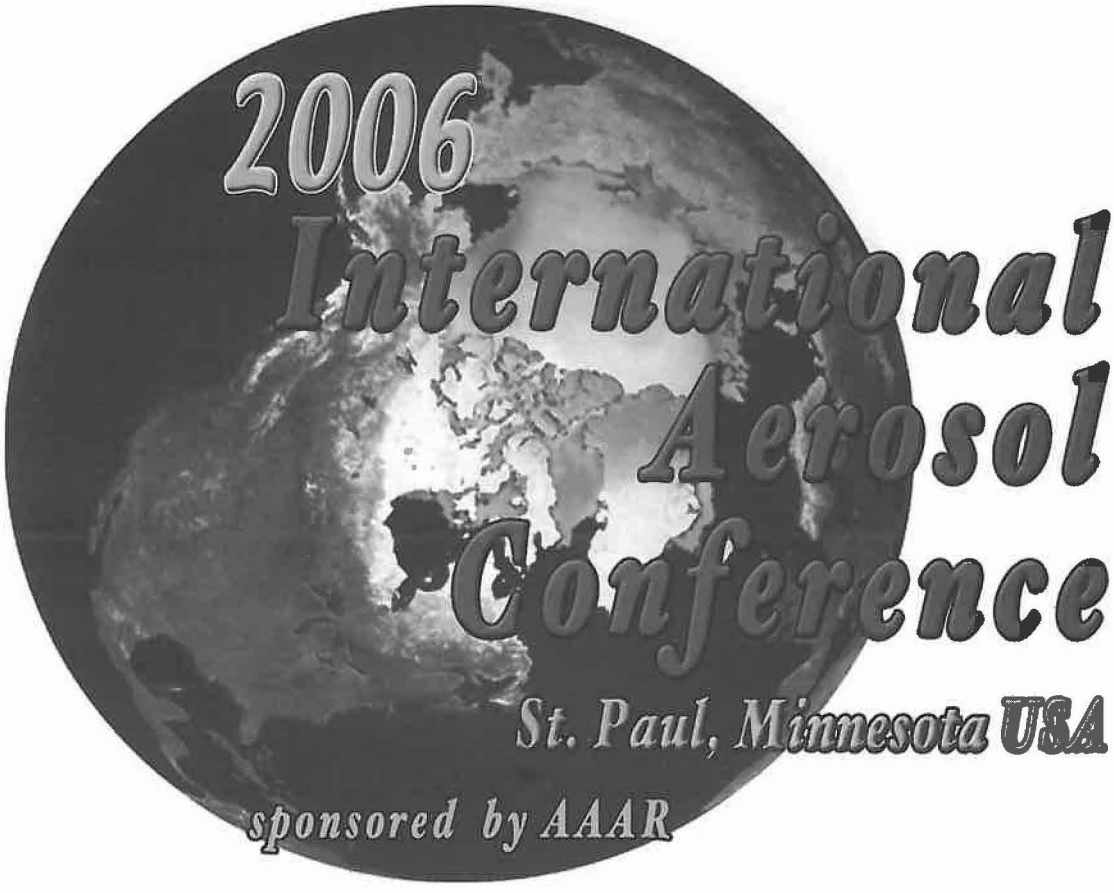

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