



### The NNN Newsletter

#### Nanotechnology Changing the *Status Quo* in the Healthcare Industry



As the debate on healthcare reform has progressed over recent years, approaching the brink of sweeping change for better or worse, one key aspect that has not entered into these

discussions is the impact of high technologies on healthcare, specifically those associated with nanotechnology. While the notion exists that one key factor to rising healthcare costs is the expense of research and innovations, recent studies have shown that this contributes only 25% to overall cost increases. While the majority of innovations are in the areas of new equipment, procedures, and therapies, ongoing debate must break down these added costs on the basis of direct benefits to patients and medical professionals. In the mean time, the area exhibiting the most potential to provide long term societal benefits and significantly lower the overall cost of healthcare is nanotechnology. Nanotechnologies have the potential to create a paradigm shift in the doctor-patient relationship and ultimately change the *status quo* for healthcare as we know it.

With a large portion of nanotechnology research focused on biomedical applications, there have been significant breakthroughs reported in the area of nanoparticles for drug delivery and therapeutics. The controllable synthesis and scalable nanofabrication processes now available for specific nanoparticle systems and surfaces that facilitate targeted drug delivery for a range of diseases enable therapies that may minimize or eliminate hospitalizations and peripheral medical treatments (see below). These technologies are best classified as nano-enabled microtechnologies and offer new capabilities such as in-home diagnostics and personalized testing that could eliminate unnecessary spending and simplify the process and application of many medical tests.

[More...](#)

Regards,  
Jeff Morse, Managing Director,  
National Nanomanufacturing Network

Learn More about the



### Upcoming Events

November 3 - 4, 2009

[UK NanoForum & Emerging Technologies 2009](#)

November 8 - 13, 2009

[AVS 56th International Symposium and Exhibition](#)

November 8 - 13, 2009

[2009 AIChE Annual Meeting](#)

November 11 - 13, 2009

[International Conference on Nanoimprint and Nanoprint Technology](#)

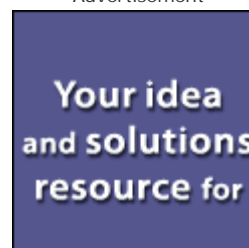
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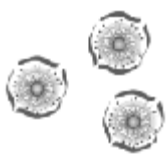
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## Nanoparticle-Polymer Array-Based Sensors for Biomedical Applications



Distinguishing between normal, cancerous, and metastatic cells is a major hurdle for the early detection of cancer, as each cell type has a unique molecular signature which includes both intracellular and cell surface biomarkers. The earlier these signatures can be detected, the more effectively they can be treated. A range of techniques have been studied to this end. While some approaches require a priori knowledge of specific mutations in DNA/RNA for both intracellular and cell surface biomarkers, others, such as array-based antibodies, have insufficient sensitivity and specificity to differentiate between normal, cancerous, and metastatic cells. In a recent study, Bajaj, et. al. describe a detection approach based on selective noncovalent interactions between the cell surface elements and functionalized nanoparticle sensors that does not require previous knowledge of specific biomarkers. [More....](#)

## Hazardous Substances Data Bank Adds First Set of Nanomaterials Records

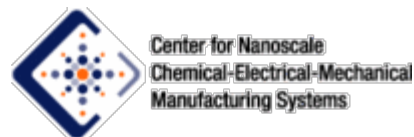


In October, the National Library of Medicine's Hazardous Substances Data Bank (HSBD)—a comprehensive, peer-reviewed database of toxicology information for over 5,000 chemicals—added seven nanomaterials records, the first set of such records in the datafile. The records cover materials such as Carbon Nanotubes, Silver Nanoparticles, and Zinc Oxide Nanoparticles. HSBD is a free and publicly available database; HSBD records include information on human health effects, environmental fate and exposure, occupational exposure standards, chemical and physical properties, as well as manufacturing and use information. [More....](#)

## Study of Chinese Print Workers Claims Evidence of Nanoparticle Toxicity

A recent study published in the well-known medical journal, the *European Respiratory Journal*, has been receiving significant publicity as the authors have claimed their findings support an apparent linkage

## Affiliated Centers



## Recently Published

### From Our Affiliates

A Plasmonic Dimple Lens for Nanoscale Focusing of Light  
[Nano Letters 9\(10\): 3447-3452](#)

Gradient Lithography of Engineered Proteins to Fabricate 2D and 3D Cell Culture Micro Environments  
[Biomedical Microdevices 11\(5\): 1127-1134](#)

Nanodiamond-Insulin Complexes as pH-Dependent Protein Delivery Vehicles  
[Biomaterials 30\(29\): 5720-5728](#)

Parylene-Encapsulated

between workplace exposures to nanoparticles and severe respiratory disease. Specifically, in this study, investigators at China's Capital University of Medical Science related unusual and progressive lung disease in seven Chinese workers, two of whom died, to nanoparticle exposures in a print plant where a polyacrylic ester paste containing nanoparticles was used. While highly tragic and certain to create a stir among regulators, the media, and the general public, it is important to recognize that this study does more to highlight the critical need to follow well-established industrial hygiene practices than to provide direct evidence in humans of any unique health risks posed by ENPs. [More...](#)

[Read more on](#) *InterNano*

Copolymeric Membranes as  
Localized and Sustained Drug  
Delivery Platforms  
[Annals of Biomedical  
Engineering 37\(10\): 2003-2017](#)

Nanopost Plasmonic Crystals  
[Nanotechnology 20\(43\): 434011](#)

Friction of Polyaromatic Thiol  
Monolayers in Adhesive and  
Nonadhesive Contacts  
[Langmuir 25\(20\): 12151-12159](#)

Convective Assembly and Dry  
Transfer of Nanoparticles Using  
Hydrophobic/Hydrophilic  
Monolayer Templates  
[Langmuir 25\(19\): 11375-11382](#)



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