AMBIENT AIR INVESTIGATION WITH NANOTECHNOLOGY

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ABSTRACT

Nanomaterials from Nanotechnology are widely used various applications such as membrane separations, catalysis, adsorption, and analysis with the goal of better protecting environmental quality. The sensors used for detecting air pollutants are usually produced by coating a sensing metal oxide layer on a substrate with two electrodes. The general mechanism for a metal oxide sensor is a change in the resistance or conductance of the sensor when it is exposed to pollutant gas, relative to the sensor resistance in the ambient air. Internet Geographical Information system software applications can be generated by huge databases of spatial information from all relevant sources. Also this study is purposed to develop a portable device, composed of the solid-state gas sensor linked to a PDA and through blue-tooth communication, tie it up to Global Positioning System (GPS). The present study is aimed to develop a cost-effective air pollution monitoring system using Nanomaterials based sensors. In order to carry out air pollution monitoring over an extensive area, a combination of ground measurements through inexpensive sensors “solid state gas sensors” and wireless Geographic Information System will be used for this purpose. Nanosensors for detecting air pollutants must be able to operate stably under deleterious conditions. The Air quality report generated can be then published using Internet GIS for real-time information service for the PCD and public participation.

Key Words: Ambient air, Global positioning system, Nanotechnology GIS, Gas sensors, Satellite communication.

INTRODUCTION

The detection of air pollutants using sensors are normally metal oxide coated with a combination of substrate with two electrodes. The general mechanism for a metal oxide sensor is a change in the resistance (or conductance) of the sensor when it is exposed to pollutant gas, relative to the sensor resistance in background air. The sensor resistance sensor output signal and is always determined at constant operation temperature. On the other hand, if a metal oxide sensor absorbs an oxidizing gas (NO2), the depletion zone at the surface will be increased, meaning decreasing conductivity. In conclusion, a change of conductivity/resistance is related to gas concentration. In the case of a ZnO sensor, conductivity...
decreases that means resistance increases when the sensor absorbs NOx, dependent on NOx concentration. Emerging technologies, including nanotechnologies, affect the social, economic, and environmental dimensions of our world, often in ways that are entirely unanticipated. There is considerable effort underway to explore uses of nonmaterial in applications such as membrane separations, catalysis, adsorption, and analysis with the goal of better protecting environmental quality. The vision of building objects from the atomic scale up combines many scientific areas of inquiry with wide implications for technology development. The production, use, and disposal of nonmaterial can be anticipated to engender a wide range of benefits and unintended consequences in social, economic, and environmental terms. It is very likely that applications of nanoscience will lead to new means of reducing the production of wastes, using resources more sparingly, remediating industrial contamination, providing potable water, and improving the efficiency of energy production and use. So-called "bright-side" implications of nanotechnology include a tremendous potential for introducing new tools that will help resolve economic growth and environmental protection.

**MATERIAL AND METHODS**

Carbon nanotubes are molecular-scale tubes of graphitic carbon with outstanding properties. They are among the stiffest and strongest fibers known, and have remarkable electronic properties and many other unique characteristics. The tubes contained at least two layers, often many more, and ranged in outer diameter from about 3 nm to 30 nm. They were invariably closed at both ends. Single-walled carbon nanotubes are generally narrower than the multiwalled tubes, with diameters typically in the range 1-2 nm, and tend to be curved rather than straight. The bonding in carbon nanotubes is in a such a way that each atom joined to three neighbours, as in graphite. The electronic properties of carbon nanotubes are also extraordinary. Especially notable is the fact that nanotubes can be metallic or semiconducting depending on their structure. Thus, some nanotubes have conductivities higher than that of copper, while others behave more like silicon. There is great interest in the possibility of constructing nanoscale electronic devices from nanotubes, and some progress is being made in this area.

**Environmental based Nanotechnology in ambient air investigation**

The applications of nanomaterials include nano-engineered particles for sunscreens and paints, carbon nanotube composites in tires, and silica nanoparticles as solid lubricants, and protein-based nanomaterials. Industrial applications currently being marketed include the use of alumina nanoparticles. Production of significant quantities of anthropogenically-derived nanomaterials will inevitably result in the introduction of new materials to the atmosphere, hydrosphere, and biosphere. Nanomaterials may differ from other particulate materials in both size and surface chemistry. These differences may affect both exposure and impacts. Nanomaterials are all surface. The mobility of nano-engineered particles in aqueous environments is a function of particle transport, transformation, and removal mechanisms. Fluid flow, gravity, and diffusion are the primary mechanisms for transport. Transformation includes particles...
precipitation, dissolution, bio-uptake, and aggregation. Particle transport may occur by advection, diffusion, and gravity. Attachment is considered to be primarily a function of particle and collector surface chemistries and is expected to vary with particle charge and the presence of adsorbed/associated material. These variables are in themselves likely to depend on the nature of the aquatic environment such as the pH and ionic strength. The potential for nanoparticle mobility in porous media such as ground waters can be quantified in bench-scale experiments in which suspensions of nanoparticles are introduced to a packed bed column and the influent and effluent concentrations. Gas sensors for detecting air pollutants must be able to operate stably under deleterious conditions. The sensors used for detecting air pollutants are usually produced by coating a sensing metal oxide layer on a substrate with two electrodes\textsuperscript{15}. The general mechanism for a metal oxide sensor is a change in the resistance or conductance of the sensor when it is exposed to pollutant gas, relative to the sensor resistance in the ambient air. Internet Geographical Information system software applications can be generated by huge databases of spatial information from all relevant sources\textsuperscript{16}. Earth observing satellites are designed specifically to measure troposphere trace gases. There are numerous satellite sensors with some type of aerosol-detection capability and the detection of smoke plumes from fire \textsuperscript{17-19}.

RESULTS AND DISCUSSION

In traditional air quality monitoring system the forecasting and reporting real time air quality index of each monitoring site should be updated in accordance with the modern requirements and increasing pollution levels. The satellite network for monitoring airspace, exchanging mission critical data and providing high quality voice communication between the airports and relay stations. A central Faraway hub in the capital connects to solar-powered remote. Each system integrates with various installed systems to create a comprehensive system. The Integrated network maintains high voice quality for local, domestic and International class, effective data transfer and supplementary services such as telex on a single platform.

CONCLUSION

The combination of measurements from current and planned environmental satellite sensors that measure the troposphere will play an increasingly important role in explaining transport processes. This work will be able to support to Pollution control board for easy monitoring system and to report real time air quality data through Wireless Internet GIS. Satellite imagery has used to characterize land cover to estimate biogenic emissions and to provide frequent data refresh and rapid downlink. The maximum use of this valuable satellite resource is to benefit the air quality forecasting mission.

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