Removal Of Toxic Gases And Odors From Corrosive Drywall Structures Utilizing OdorKlenz Products.

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NanoScale Corporation has been actively involved in resolving the corrosive drywall challenges. The company's history of destructive adsorption products for both surface and air decontamination combined with field activities and procedure validation are well aligned for solving the challenges faced by homeowners with corrosive drywall.

This document discusses: the problems that need to be resolved with corrosive drywall; NanoScale's science, technology, and past research efforts that are the foundation of a solution; corrosive drywall laboratory and field studies conducted by NanoScale; and NanoScale's OdorKlenz products.

Contents

Background

Over one hundred thousand homes, across more than 20 states, have become afflicted with a toxic chemical and odor problem caused by 500 million pounds of "Chinese" or corrosive drywall imported between 2005 and 2007. This drywall is now emitting hazardous sulfur-containing chemicals that are corroding air handling systems, plumbing, electrical systems, and appliances. Homeowners are blaming it for health problems ranging from headaches to severe respiratory ailments. As a result, the affected homes have significantly reduced in value and often become uninhabited.

The Washington Post, Wall Street Journal, and many other national media outlets have detailed this enormous problem. National Public Radio calls this housing disaster a "silent hurricane." Consulting firm Towers Perrin estimates the damages could range from $15 billion to $25 billion. Building industry experts estimate that it will cost, on average, $100,000 per home to replace the corrosive drywall and damaged infrastructure. Large construction corporations, such as Lennar and Hovnanian, have already set aside hundreds of millions of dollars to repair these homes, and the Louisiana Recovery Fund, founded after hurricane Katrina, has reallocated money to help homeowners.

Several government agencies, including the U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency, U.S. Department of Housing and Urban Development, Centers for Disease Control and Prevention, Agency for Toxic Substance and Disease Registry, and numerous state departments of health are urgently investigating the drywall issue.

As the responsibility of the problem is debated in a series of legal issues, homeowners with corrosive drywall are in a very emotional and difficult position as they are forced to either live in their "unhealthy" home, purchase or rent another property, or make extensive and costly repairs out of pocket.

Problem | Chemistry

"Chinese" or corrosive drywall is known for off-gassing hydrogen sulfide (H_2S) and sulfur dioxide (SO_2) as well as other potentially hazardous sulfur-containing compounds. These gases can build up in a closed house to concentrations ranging from 5 ppb up to a few ppm. H_2S is detectable to most humans at 4.7 ppb, evidencing a rotten egg stench. H_2S is toxic at ppm concentrations with a permissible exposure limit (PEL) of 10 ppm over 8 hours, but there is some evidence that suggests that relatively low concentrations such as 1 to 2 ppm can be unhealthy over prolonged exposures.

In addition to health and comfort concerns, these sulfur compounds rapidly cause corrosion of copper pipe, copper wiring, and other metal fixtures inside the house. This process is often used to diagnose corrosive drywall containing homes and can cause extremely expensive replacement including wiring, water pipes, air ducts, appliances, and the destruction of coils in the HVAC system.

SO_2 has a pungent, acrid odor and combines with ambient moisture to form sulfuric acid, which can also damage construction materials such as metals and concretes.

Overview | OdorKlenz

NanoScale, a leader in chemical decontamination and odor elimination, began evaluating its integrated systems and materials for corrosive drywall odor/chemical removal in the fall of 2009.

NanoScale's metal oxide powders are excellent at adsorbing, trapping, and destroying chemicals. For years, NanoScale's decontamination products have been helping HAZMAT teams, First Responders, and Environmental Health & Safety personnel contain and neutralize hazardous liquid and vapor chemicals. Thousands of OdorKlenz-Air™ Cartridges have been used for disaster restoration odor elimination. NanoScale's existing technology has been adapted for the corrosive drywall market because of the superior ability to capture a multitude of chemicals, including sulfur gasses.

NanoScale has the OdorKlenz system to include components for addressing off-gassing from structural surfaces, airborne corrosive gases and odors, and residual cross-contamination that collectively provide solutions for:

- Air Mitigation
- Stabilization
- Remediation

The following are NanoScale's current product offerings for the corrosive drywall market.

OdorKlenz Air Treatment Cartridge

OdorKlenz Air Treatment Cartridge is a specially designed cartridge that captures airborne chemicals and odors. The cartridge is installed into the property's air handling system (HVAC) to reduce airborne chemical contaminants. It can be used prior to a complete remediation, during remediation, or after remediation to capture corrosive gases and "characteristic" odors.

OdorKlenz Structural Surface Treatment

OdorKlenz Structural Surface Treatment is a liquid that is easily sprayed on and behind surfaces during remediation that were in contact or close proximity with the corrosive drywall. It leaves behind a safe residual coating that will continue to adsorb and neutralize harmful residual chemical contaminants

OdorKlenz Laundry Treatment

OdorKlenz Laundry Treatment is used on a variety of washable surfaces and personal belongings (clothing and fabrics) to prevent cross contamination or recontamination of a restored structure. Without some form of treatment, these items could be responsible for the re-emergence of sulfur odors even after a home is remediated.

Research confirms that NanoScale's OdorKlenz technology captures and destroys many

chemicals through a combination of both physical and chemisorption mechanisms. The advanced high surface area chemistry of NanoScale's products, in combination with high neutralizing reactivity and disciplined processes provide superior results.

Scientific Basis For The Effectiveness Of NanoScale's Technology For Remediation Of Toxic Chemicals

NanoScale has developed a proprietary line of *safe,* high surface area metal oxide powders. The proprietary manufacturing methods were developed with a goal of enhancing adsorption kinetics, chemical reactivity, and maintaining the inherent safety characteristics of earth minerals, for the destruction of toxic materials, including air and water pollutants, hazardous chemicals, biological organisms, and even chemical warfare agents.

NanoScale's manufacturing techniques produce advanced micron size particles (2-10 µm) with very high porosity (up to 1.5 cc/g). This porosity allows for the entire particle to be utilized in the "destructive absorption" process. Specifically, the molecular structure allows for higher chemical reaction and faster binding affinity to reactive agents on surfaces or in the air. This highly porous structure enables the materials to absorb substances into the pore space by contact with unsaturated atoms/ions on the corners and edges of the crystal lattice.

During the interaction of a target agent and the material, a two-step decomposition process takes place (first step - adsorption of the target agent on the surface by means of physisorption, followed by a second step - chemical decomposition). This two-step mechanism substantially enhances detoxification abilities of the materials by making the decomposition less dependent on the rate of chemical reaction and the reaction products are stuck to the surface.

Since the surface adsorption remains active even at very low temperatures and because all potential toxic agents are subject to physisorption (which is then followed by destructive adsorption), NanoScale's materials do not have the drawbacks often observed with vaporous or liquid solutions that are often temperature dependant.

Corrosive Drywall & Related Studies

The following studies and experiments were conducted by NanoScale to evaluate the removal or stabilization of characteristic corrosive drywall odors and chemicals.

The experiments were constructed to:

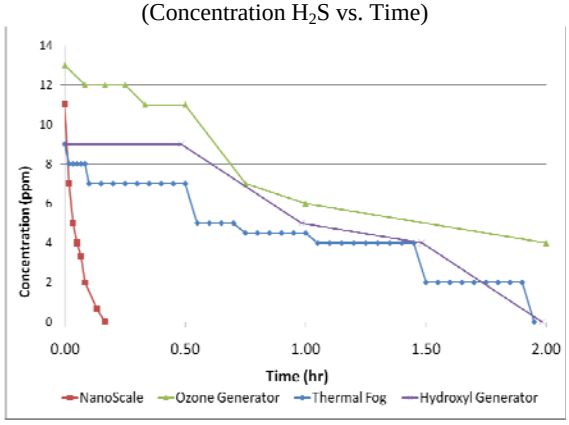
1) Verify the OdorKlenz Air Treatment Cartridge's capability to capture airborne chemicals in laboratory chamber studies and in corrosive drywall homes;
2) Determine the impact of the OdorKlenz Air Mitigation process on corrosion;
3) Determine the impact of the OdorKlenz Air Stabilization process on odor levels in corrosive drywall homes; and
4) Evaluate off-gassing from structural and textile surfaces and quantify the impact of the OdorKlenz Structural Surface Treatment.

Removal Of Airborne Chemical Contaminates

NanoScale has conducted both chamber and field studies related to characteristic corrosive drywall chemicals. The first study compares removal of airborne hydrogen sulfide (H_2S) in an enclosed chamber. NanoScale's OdorKlenz Air Treatment Cartridge, along with three other techniques for odor removal were compared: ozone (oxidation), chemical thermal fogging (chemical paring), and hydroxyl generation (free radicals).

The chamber was contaminated with H_2S at a target of 10 ppm. The gas was allowed to equilibrate and then the odor control mechanisms were remotely turned on. As illustrated in the following graph, the OdorKlenz Air Treatment Cartridge removed the H_2S from the environment faster than the other processes.

Graph: Comparison Of The Removal Of Hydrogen Sulfide By Various Technologies
(Concentration H_2S vs. Time)



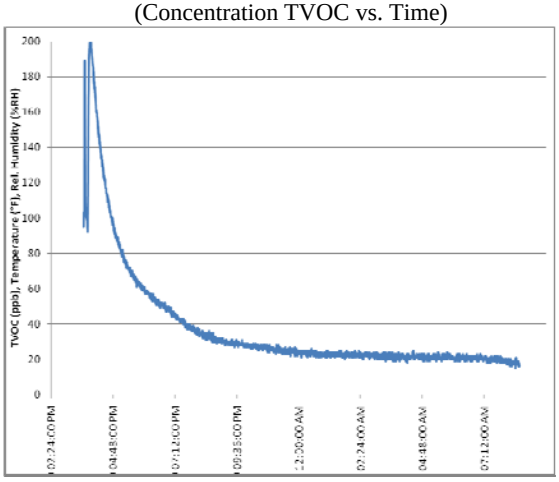
This illustrates the ability of NanoScale's technology's to remove high concentrations of H_2S in acute situations, as well as the superior performance over oxidizing techniques (ozone generator), chemical treatments (thermal fogging), and free radical treatment (hydroxyl generators). The air cartridge technology is safe, does not rely on releasing chemicals or chemical reactions in the environment, and most importantly it can be used in the presence of people. This data is significant to both short-term air stabilization processes and long-term control for affected homeowners.

In another study, NanoScale demonstrated the ability of the cartridge to reduce total VOCs in a corrosive drywall home. A portable air system was setup in an isolated section of a home. The system had an OdorKlenz Air Treatment Cartridge installed. A Grey Wolf Direct Sense TG-503 Probe with a total VOC sensor was used to monitor in parts per billion ranges.

In the 16-hour monitoring period, NanoScale was able to demonstrate the ability to reduce total VOCs ranging from 100-200 ppb to less than 40 ppb with a continuing downward trend.

The following graph illustrates the process where the monitor was turned on simultaneously to the portable air system with the air cartridge. An initial disturbance in the air pattern was observed (as indicated by the fluctuating TVOC), but within just a few hours the TVOC were reduced by at least 50% and approximately 80% in just 16 hours.

Graph: Removal Of Total VOCs In A Corrosive Drywall Home By OdorKlenz Air Treatment Cartridge
(Concentration TVOC vs. Time)



Reduction Of Copper Corrison Due To OdorKlenz Air Stablization Process

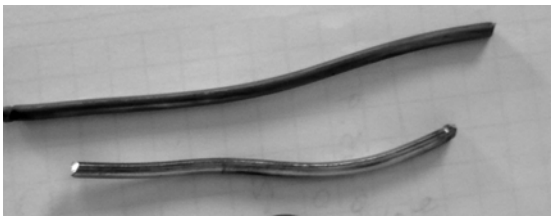
NanoScale conducted additional studies in homes utilizing the air cartridge and copper wires to monitor environmental impact. Air system with OdorKlenz Air Treatment Cartridges were set up to achieve 1-2 air exchanges per hour in the structure to simulate a home HVAC system.

Copper wire was used as a visual indicator for corrosion. After the first 24 hours of exposure, corrosion was observed (image below). The top wire is the one that was exposed in the home environment and significant corrosion has begun as indicated by the blackening. The bottom wire is an unexposed control.

Image: Baseline Testing For 24-Hour Corrosion Of Copper Wire
(Day 1 of Experiment | Color Picture)

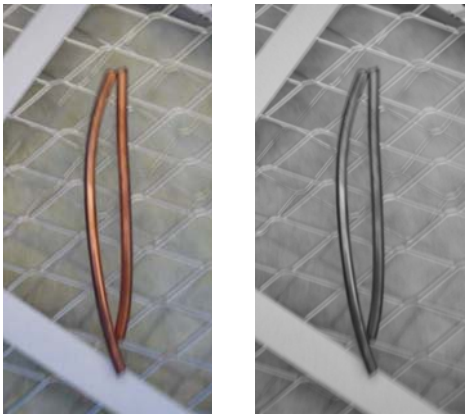
Pictured below, the previous image was converted to grey-scale to illustrate the difference observed since the color image does not fully represent the significance of the corrosion.

Image: There Was Substantial Corrosion Of Copper Wire In A 24-Hour Period Before OdorKlenz Air Treatment Cartridge Installation
(Day 1 of Experiment | Grey-Scale Picture)



At the end of the experiment (days 6-7), the 24 hour exposure was repeated. No differences were observed between the wire exposed to the air treated with the air cartridge and unexposed control wire (below).

Image: Reduction Of Copper Wire Corrosion Due To The OdorKlenz Air Treatment Cartridge Mitigation Process
(Day 7 of Experiment, color and grey scale)



This data is significant because it confirms the observations from the U.S. Consumer Product Safety Commision report and illustrates the significant positive air quality impact of the OdorKlenz Air Treatment Cartridge on the environment.

Follow on field studies using copper corrosion coupons were conducted. The copper coupons were placed in a blower and allowed 24 consecutive hours of exposure to the corrosive drywall home interior at different points during the test.

Before OdorKlenz Air Treatment Cartridges were installed, a baseline of corrosion was taken (first exposure period). The OdorKlenz Air Treatment Cartridge was installed and allowed to run for 5 days. On day 4, a second coupon was allowed 24 hours of exposure (second exposure period). Then on day 5, the corrosion coupon was removed along with the cartridge, and a second OdorKlenz Air Treatment Cartridge was installed. On day 9, a third corrosion coupon was allowed 24 hours of exposure (third exposure period).

Image: Reduction In 24-Hour Corrosion Of Copper Coupons Observed During The OdorKlenz Air Stabilization Process
(Before stabilization, 5 days into mitigation, and 10 days into mitigation)

As illustrated in the image above, the OdorKlenz Air Mitigation process had a significant positive impact by reducing the corrosive gases in the air. There was substantial reduction in the visible corrosion from the baseline to day 5, and again from day 5 to day 10. The overall reduction in just 10 days was dramatic.

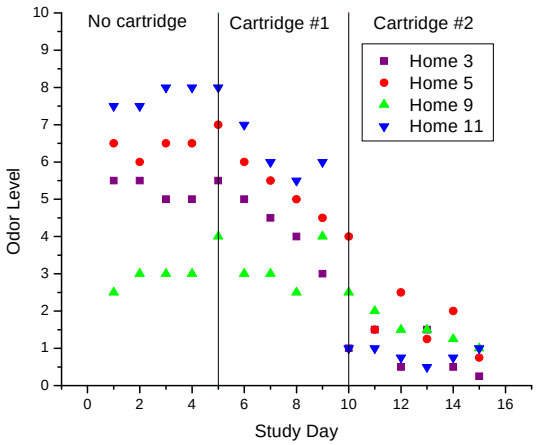
Reduction In "Characteristic" Odors In Corrosive Drywall Homes

NanoScale conducted qualitative odor testing in both occupied and unoccupied corrosive drywall homes.

A qualitative "Odor Level" scale from 0 (no odor) to 10 (extreme) was used by investigators to evaluate the odor in each home for each day of the study. As the graph below shows, the odor significantly decreased during the course of the study, and especially after day 10 when a new OdorKlenz Air Treatment Cartridge was installed. It is important to remember that the 0-

5 day period was conducted with no cartridge in order to get a baseline reading, and that OdorKlenz Air Treatment Cartridges were added at day 5 and exchanged at day 10.

Graph: Significant Removal Of "Characteristic" Odors Were Observed Once The OdorKlenz Air Treatment Cartridge Was Installed
(Odor vs. Time)



The baseline "characteristic" corrosive drywall odor was determined leading up to the installation of OdorKlenz Air Treatment Cartridges.

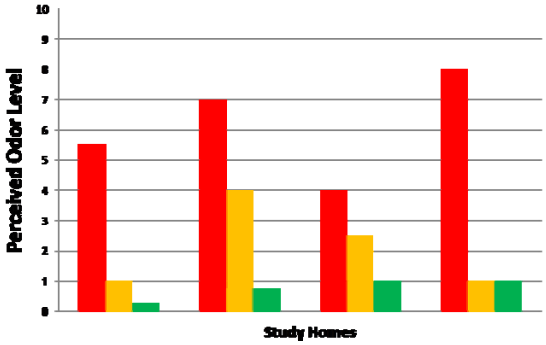
Once installed, the cartridges removed significant airborne odors in the first 5 days and were then replaced with a new cartridge. A significant reduction of the characteristic odor was observed at each phase.

In the first 10 days, the odors were significantly reduced by the cartridge capturing the airborne corrosive gases and chemicals.

For each of the four unoccupied homes studied, the odor on the last day of each 5-day period (5, 10, and 15 days) was compared (graph below). This illustrates the difference each treatment stage has made in the air quality inside the home. Over the course of the study, each home began with a strong, unpleasant odor and was reduced over ten days of treatment to a relatively light-to-no smell.

Graph: Odor Comparison Before And During The OdorKlenz Air Mitigation

(Red Before, Yellow Day 5, Green Day 10)



Observed Sulfur Off-Gassing From Corrosive Drywall Contaminated Materials

NanoScale obtained surface and construction materials from a corrosive drywall home. Although the samples size and diversity was small, the results indicated the severity of the off-gassing problem. Drywall, wood studs, and textiles were sampled, heat treated to accelerate off gassing, and analyzed for corrosive drywall characteristic chemicals.

The detection of the sulfur compounds off-gassing was performed with Gas Chromatography Flame Photometric Detector (GC-FPD) using a sulfur filter and the method outlined in the table below.

Table: GC-FPD Settings For Hydrogen Sulfide Detection.

Component	Setting | Details
Column	Alltech 5% SE-30 on CWHP 80/100, 6' length, 1/8" ID, 0.085" film
Inlet	230 C
Detector	250 C
Oven	70 C hold 0.5min, ramp to 100oC at 65oC/min, hold 1 min

Calibration of the instrument indicated a detection limit of approximately 20 ppb hydrogen sulfide at a residence time of 0.4 minutes. The sulfur dioxide and carbon disulfide peaks overlap, making them indistinguishable from each other, with a residence time of 0.5 minutes.

The sample size for surfaces was approximately 1 gram. The samples were sealed in headspace vials under ambient humidity conditions. The

samples were heated in an environmental chamber (71° C) for 18 hours to facilitate off-gassing and increase the concentration of H_2S, CS_2, and SO_2 in the test system to detectable amounts. A 1.0 ml gas sample was removed from the test system and analyzed.

Table: Observed Accelerated Off Gassing From Defective Drywall Contaminated Materials.

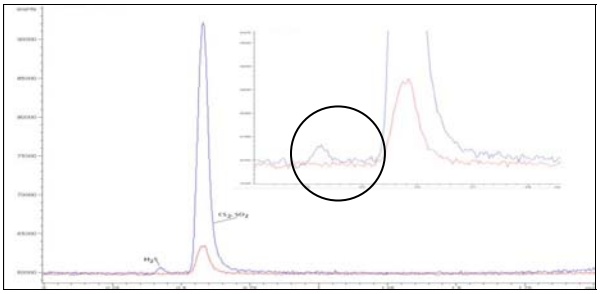
Surface	H_2S (Peak Area)	Other Sulfur (Peak Area)
Drywall	19,117	3,456,942
Wood Studs	6,114	1,603,235
Textiles	12,044	206,271

The results indicated that all surfaces did in fact off-gas the characteristic sulfur compounds. This is significant because it indicates that a stabilization or remediation approach should take into consideration all surfaces for an effective process.

Treatment Of Sulfur Off-Gassing Surfaces

Using the detection method and an additional sample of corrosive drywall from the experiments described in the previous section, the surface was treated using NanoScale's OdorKlenz Structural Surface Treatment formulation with a light coating.

The treated drywall sample was sealed in a headspace vial under ambient humidity conditions then heated in the environmental chamber to facilitate off-gassing. A gas sample was removed from the test system and compared to the control.



Graph: Reduction Of Off Gassing Hydrogen Sulfide From Corrosive Drywall Due To OdorKlenz Structural Surface Treatment
(residence time vs. peak area)

In the graph above, the blue line (top profile) represents the detection of various chemical compounds coming from the untreated reactive drywall.

The first peak observed (see circled inset for magnification) is that of hydrogen sulfide (H_2S) and the second taller peak is for CS_2 and SO_2.

The second red line is the observed gasses coming from the corrosive drywall sample treated with the OdorKlenz Structural Surface Treatment. For the treated sample, the H_2S was removed (>99%) to below detection limits of the GC and the CS_2 and SO_2 (large peak) were reduced by approximately 87%. The results are even more significant because of the continued presence of the contaminated source.

The OdorKlenz Structural Surface Treatment formulation, and method of application, works well for the treatment of various structural surfaces during remediation and home stabilization.

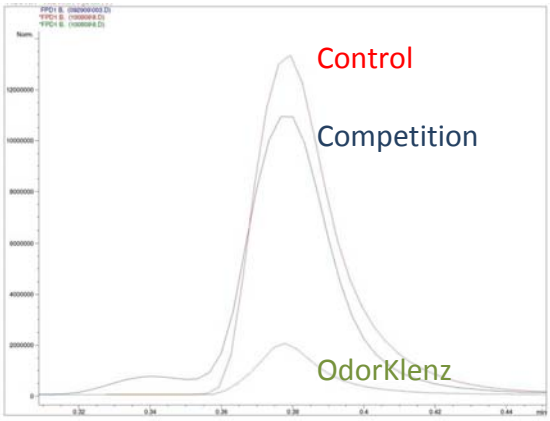
Comparison Of NanoScale's Application And Effectiveness

NanoScale's OdorKlenz solutions offer advantages over oxidation methods (including, but not limited to chlorine dioxide) that produce hazardous reaction products in the environment (the oxidation of H_2S can result in SO_2, another chemical suspected to cause issues in corrosive drywall homes).

The chlorine dioxide process forms the specific reaction products chlorite and chlorate. Generator efficiency and optimization difficulty can cause excess chlorine to be fed at the application point, which can potentially form harmful halogen-substitute DBPs (disinfection by-products). Chlorine dioxide gas is explosive and can produce noxious odors.

The OdorKlenz Air Treatment Cartridge does not put or release chemicals (or reaction products) out into the environment.

Graph: Reduction Of Off Gassing Hydrogen Sulfide From Corrosive Drywall Due To OdorKlenz Structural Surface Treatment And Comparison To Competition.
(Red =Control, Blue = Competition, Green = OdorKlenz)



Safety of NanoScale's Materials

As a leading marketer, developer, and producer in the advanced chemistry industry, NanoScale Corporation has consistently maintained a strong sensitivity to safety related matters. NanoScale has recognized, and is sympathetic to, the numerous environmental and health concerns that currently exist in the world. It is the company's goal to develop safe and innovative solutions, products, and services.

NanoScale's efforts have always been directed towards enhancing and improving the already established methodologies used in the neutralization of hazardous wastes, spills, odors, and treatment of chemical warfare agents through the continued development and manufacture of our products.

As with most emerging technologies, the sensitivities to human health and the ecosystem are brought to the forefront. NanoScale has taken the commitment to providing products that are safe to humans and the environment very seriously. Despite the absence of any regulatory requirements for these new materials, NanoScale has utilized independent certified laboratories to conduct evaluations of our products for health and safety risks. The materials have been proven safe through oral, pulmonary, ocular, and dermal toxicology testing. They have been shown to be no more toxic than their non-nanocrystalline analogues; in fact, most of the products can be land filled within Federal guidelines and regulations.

NanoScale pledges to emphasize safety while developing new and innovative technologies, products, and applications to better serve our citizens, communities, and world.

Extensive third party safety and toxicological testing has been conducted on NanoScale's materials and blends. The materials were evaluated by the USACHPPM (Unites States Army Center for Health Promotion and Preventive Medicine) Directorate of Toxicology, and MPI Research. The tests followed Environmental Protection Agency protocols and included acute oral toxicity, acute dermal toxicity, skin irritation, skin sensitization, eye irritation, and inhalation.

NanoScale utilizes materials with benign chemical properties that are inherently safe and often are utilized as food additives and in medicinal products.

Government Sponsored Projects Related To Sulfur Abatement

DOE Phase I SBIR

The overall objective of this research was to determine the technical and economic feasibility of utilizing high surface area metal oxides and their related derivatives (core-shell, coated and surface functionalized) for upgrading the quality of raw natural gas into pipeline quality gas (removing contaminants including hydrogen sulfide). During this project several materials were identified as effective for adsorption of contaminants present in natural gas. In contrast, the corresponding commercial samples showed no adsorption.

CTTSO/TSWG BAA Destructive Adsorption Air Filtration Systems

In this work novel air filtration systems utilizing NanoScale technology were developed. The materials were capable of neutralizing chemical warfare agents as well as toxic industrial chemicals (i.e., SO_2 and methyl mercaptan) with the formation of nontoxic reaction products. Performance against 12 toxic agents was assessed utilizing infrared spectroscopy, recirculating reactor, weight gain method, air filtration breakthrough apparatus, and thermogravimetric analysis coupled with infrared analysis.

NIH Phase I SBIR Air Filtration of TICs

Metal oxides were developed, tested, and proven effective for air filtration of toxic industrial chemicals (TICs) of interest to National Institutes of Health, such as acid gases including H_2S, SO_2, acetaldehyde, and HCl. The research activities included: preparation and characterization of the metal oxides in powder and granulated forms, testing of granulated adsorbents against selected TICs, using the air filtration breakthrough apparatus, desorption studies of metal oxides and activated carbons using thermogravimetric analysis, and evaluation of mass transport properties of granulated metal oxides and modeling of a packed bed air filter. The materials were proven to be more effective than activated carbon against polar and highly volatile chemicals.

Army Phase I and II SBIR New Generation Materials for Chemical & Biological Protection

The goal of this project was to develop a new generation of sorbent materials based on NanoScale's metal oxide technology that would have significant adsorption capacity for a much wider range of toxic industrial chemicals (TICs) and chemical warfare agents (CWAs) compared to ASZM-TEDA carbon. During the course of this research, studies were done to correlate the physical and chemical characteristics of a sorbent to its performance against various types of threats including specific characteristic and resulting effects from metal ion incorporation.

The purpose was to understand what specific characteristics were most important in the efficacy of a specific sorbent in this type of application and customize a comprehensive sorbent material that was effective against a wide range of polar and non-polar compounds. This research proved the company's capabilities to design and customize materials to meet Customer requirements.

EPA Phase I and II SBIR Removal of Reduced Sulfur & Nitrogen Compounds from Fuel Gas

In this on-going effort, NanoScale is developing new sorbents and catalysts for hot gas cleanup technology to allow for removal of reduced sulfur (H_2S and CO_S) and ammonia pollutants from coal-generated fuel gases (IGCC) at gasification operating temperature. The testing includes both laboratory scale experiments, as well as pilot-scale demonstrations with real fuel gas at the Western Research Institute. The manufacturing methods are easily scalable, cost efficient, and environmentally friendly.

Company | Supplemental Information

NanoScale Corporation

NanoScale Corporation (NanoScale®) is a dynamic and innovative Company focused on the development and commercialization of our proprietary advanced materials, including nanocrystalline metal oxides, and organometallic compounds. The company produces and sells packaged and bulk high performance materials, application services related to the materials, and application development contracts. The advanced materials are available under the brand names NanoActive®, FAST-ACT®, OdorKlenz®, ChemKlenz®, NanoZorb®, SpillKlenz™ and OdorKlenz-Air™.

The advanced materials are non-toxic, non-corrosive, and environmentally safe. The materials exhibit the unique and important reactivity characteristics of nanomaterials without the concerns and perceived risks often associated with nanoparticles. The materials are commercially available in a variety of forms to match specific application requirements-powders, dry and liquid sprays, emulsions, aggregates, and mixtures.

A primary performance capability of the advanced materials is to remove, destroy, neutralize, and/or protect against a wide variety of toxic and noxious chemical and biological agents. The materials generally work by adsorbing and reacting with the chemical and/or biological targets to create environmentally safe reaction products.

NanoScale's advanced materials technology is the result of over $30 million of contract research and applications development for the U.S. Department of Defense, National Science Foundation, Environmental Protection Agency, other federal agencies, and numerous private sector joint development agreements.

In addition, NanoScale maintains an active internally funded R&D effort. The Company has ownership and exclusive rights to twenty-four (24) issued U.S. patents and seventeen (17) issued International patents with an additional six (6) U.S. and thirty-eight (38) International patents filed and pending.

The Company's technology, advanced materials, and development expertise have been directed at the following general application categories:

- Containment and neutralization of toxic chemicals, including Chemical Warfare Agents
- Air Quality and Odor Elimination
- Environment and Energy (Clean and Green)
- Antimicrobial Applications
- Human Health

A dedicated team of technical and business development professionals focuses on the generation of government and private sector research contracts, development agreements, and Customer-driven solutions. Field and Customer Support activities are handled by a combination of Region Managers, national and specialty distributors, independent representatives and consultants, and internal Customer Support Representatives.

The Company occupies a state-of-the-art laboratory, office, and production facility in Manhattan, Kansas. Production and laboratory operations are carried out under strict compliance with internal quality assurance procedures, Good Laboratory Practices (GLPs), current Good Manufacturing Practices (cGMPs), and ISO 9001:2000. The Company became ISO 9001:2000 certified in 2005, successfully completed recertification in 2008, and transitioned to ISO 9001:2008 compliance in 2009.

The Company has a well qualified management team, an experienced and active Board of Directors, an internationally recognized Science & Technology Advisory Council, a professional and productive work force, and a supportive stockholder base.

The potential economic and societal contributions of high performance materials are extensive. This potential has prompted U.S.

Federal agencies and chemical companies of all sizes to commit significant resources for research and development.

NanoScale's products and services, production and research capabilities, and intellectual property portfolio have positioned the Company as a leader in high performance materials and related products and services

Bill R. Sanford - Chairman of the Board

Bill R. Sanford is Founder and Chairman of Symark LLC, a private equity, technology commercialization, and business development organization. He is also Executive Founder and retired Chairman of the Board, President, and Chief Executive Officer of Steris Corporation (NYSE:STE), a global leader in infection and contamination prevention systems, products, services, and technologies. He serves as a Board Member of KeyCorp (NYSE:KEY), Greatbatch, Inc. (NYSE:GB), Cleveland Clinic, BioEnterprise Corporation, Kansas Bioscience Authority, and several early and growth stage technology companies and investment partnerships.

Mr. Sanford is an experienced entrepreneur, executive, consultant, investor, and board member with extensive new venture, merger and acquisition, turnaround, senior management, and market development experience. His business career has focused on the development and commercialization of bioscience products, health services, advanced information systems, and other innovative technology applications. He holds several patents and is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE).

Aaron W. Madison – Chief Operating Officer

Mr. Aaron W. Madison serves as the Chief Operating Officer for NanoScale Corporation, previously holding the position of Corporate Controller.

Prior to joining NanoScale in 2000, Mr. Madison held the position of Manager of Federal Excise Taxes with Koch Industries, Wichita, Kansas, where he was responsible for the compilation and submittal of the company's $1.5 billion dollar annual remittance. While employed at Koch, he was recognized for his leadership and management of the corporation's year-end inventory planning and numerous tax initiatives, which resulted in significant corporate savings.

Mr. Madison obtained his B.A. and M.S. degrees in Accounting from Kansas State University and received his CPA license in 1997. He holds the added distinction of passing the CPA examination upon the first seating, which is an accomplishment held by only 5% of those that test for CPA licensing in the State of Kansas.

Olga B. Koper - Vice President, Technology and Technical Services & Chief Technology Officer

Dr. Olga Koper earned her M.S. in Chemistry from Silesian University in Katowice, Poland and her Ph.D. in Inorganic Chemistry from Kansas State University under the direction of Dr. Kenneth J. Klabunde.

Dr. Koper was NanoScale's first full-time employee, joining the company in 1996 as a Senior Scientist. During her career at NanoScale she served as Director of Research and Development, Senior Director of Technology, and Senior Director of Technology and Technical Services. In July 2004 she was promoted to the position of Vice President, Technology and Technical Services and was additionally named Chief Technology Officer in July 2007. Dr. Koper has considerable experience in the synthesis, characterization and applications of nanoparticles. She has co-authored over 25 papers and co-holds 21 patents in the area of nano-chemistry. As part of her activities, she coordinates all of NanoScale's federal and state government contract procurement efforts as well as application development and marketing endeavors.

David A. Jones - Vice President, Engineered Solutions

Mr. David Jones has been with NanoScale Corporation since 1999. During this period he has held a number of management positions including: Process Engineer Manager, Director of Manufacturing, Director of Engineering Services, and Senior Director of Engineering and Production.

Mr. Jones is an expert in the optimization of reactive nanomaterials. His ability to successfully scale-up production of these specialty chemicals and products while maintaining or improving critical characteristics has been instrumental in the development of the Company's commercial product lines. Over the last several years, he has worked closely with both the Environmental Protection Agency (EPA) and the National Science Foundation (NSF) on a number of research projects, and is an active member of the American Institute of Chemical Engineering. His responsibilities include Engineered Solutions, product development, process improvement, engineering, materials management, manufacturing and production. Prior to coming to NanoScale, Mr. Jones was employed by Schlumberger in Midland, Texas.