Odor Control in Spacecraft Waste Management, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Spacecraft and lunar bases generate a variety of wastes containing water, including food wastes, feces, and brines. Disposal of these wastes, as well as recovery of water, is necessary. However, evaporation of water also evaporates compounds with foul odors, some of which are much more volatile than water. Even apart from a water recovery system, foul odors sap crew morale, and must be eliminated. NanoScale

REG

Corporation has developed a formulation of its proprietary sorbents, termed OdorKlenz

TM

, that has been shown to effectively remove odorous compounds from air by destructive adsorption. NanoScale proposes development of a similar formulation, built around nanocrystalline metal oxides manufactured by NanoScale's proprietary procedures, such as NanoActive TiO2, NanoActive MgO, and NanoActive ZnO, to remove foul odors in a system that can recover water from wastes. The odor control system will function during waste storage, and also during water recovery . In Phase I, NanoScale will demonstrate feasibility by developing a formulation of metal oxides capable of removing odorous compounds from food and sanitary wastes, and compatible with a water recovery system. Specific test compounds include skatole (3-methylindole, found in feces), putrescine (1,4-diaminobutane, in rotten protein), ammonia (urine), ethanethiol, hydrogen sulfide (rotten eggs, flatus), butyric acid (rancid butter), and butyraldehyde. Gas streams containing these compounds will be passed through beds of the metal oxide formulation, with concentrations measured by GC, before and after passing through the bed. In Phase II, the odor control system will be integrated into the specific details of spacecraft and envisioned lunar stations. Then, brassboard hardware will be developed and evaluated. NanoScale, having pioneered the synthesis and manufacture of nanocrystalline metal oxides for destructive adsorption of hazardous compounds, is uniquely qualified to perform the proposed work.

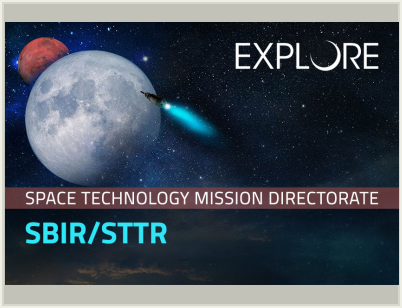

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Table of Contents

Project Introduction 1
Primary U.S. Work Locations and Key Partners 2
Project Transitions 2
Organizational Responsibility 2
Project Management 2
Technology Maturity (TRL) 2
Technology Areas 3
Target Destinations 3

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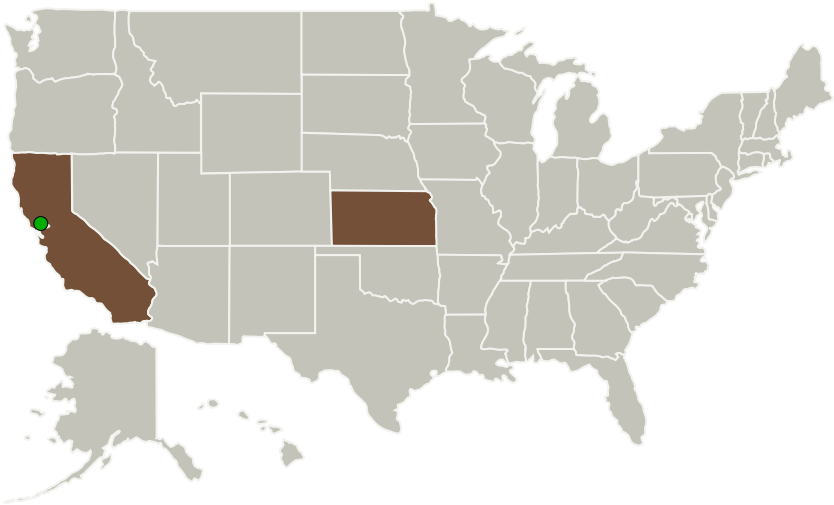
Completed Technology Project (2010 - 2010)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Nanoscale Materials, Inc.	Lead Organization	Industry	Manhattan, Kansas
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Kansas

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139306)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Nanoscale Materials, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

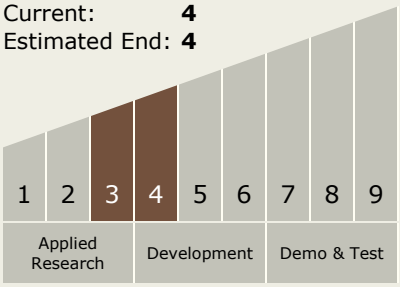
Carlos Torrez

Principal Investigator:

Franklin O Kroh

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - └ TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System