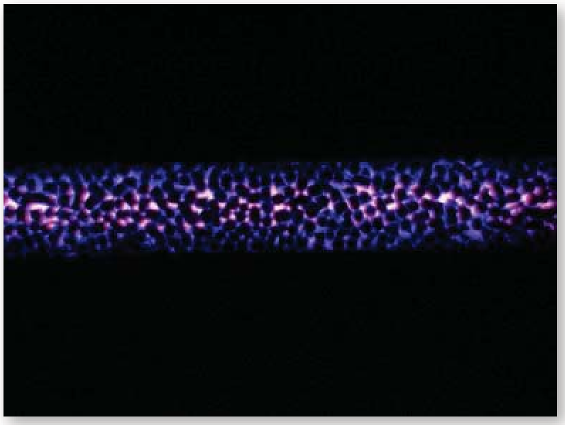
Visible Light Responsive Catalyst For Air & Water Purification Project

Center Innovation Fund: KSC CIF Program

Space Technology Mission Directorate (STMD)

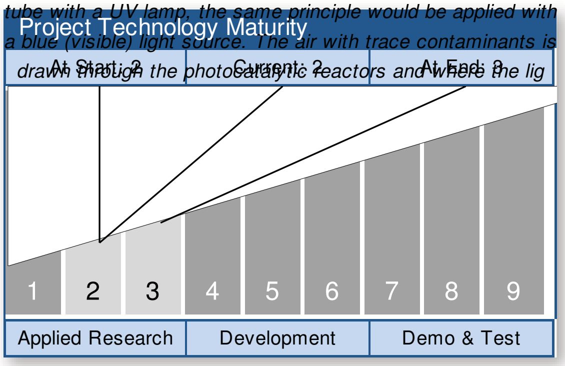
National Aeronautics and Space Administration



Although this shows a titania catalyst/sorbent bed in a glass tube with a UV lamp, the same principle would be applied with a blue (visible) light source. The air with trace contaminants is drawn through the photocatalytic reactors and where the lig

ABSTRACT

Investigate and develop viable approaches to render the normally UV-activated TiO2 catalyst visible light responsive (VLR) and achieve high and sustaining catalytic activity under the visible region of the solar spectrum.



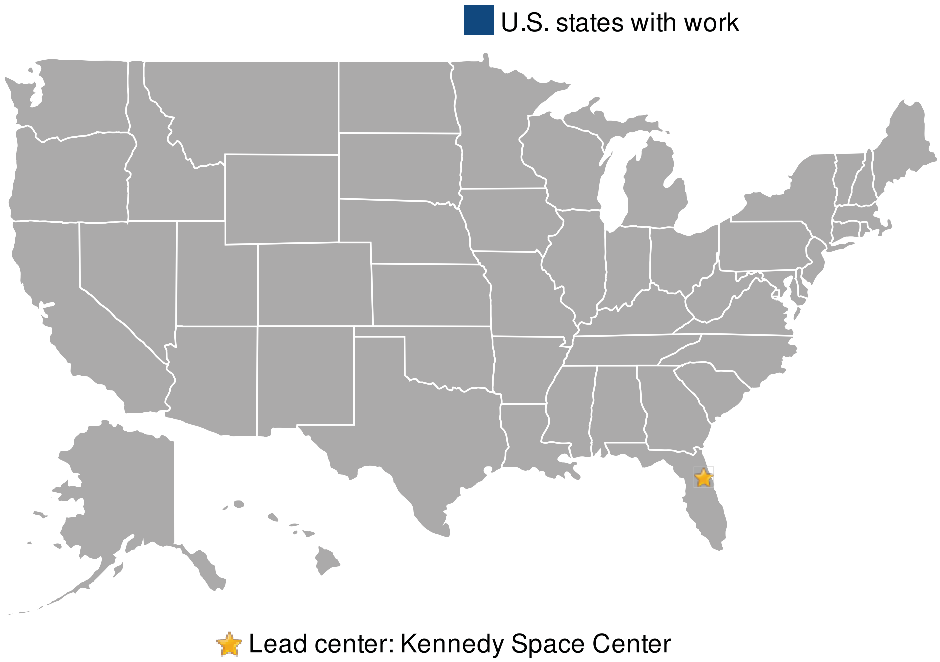
Technology Area: Human Health, Life Support & Habitation Systems TA06 (Primary)

ANTICIPATED BENEFITS

To NASA funded missions:

Relevance and Value to NASA and the Nation – VLR-catalysts eliminate the hazards associated with UV radiation, enable the use of long lasting and highly efficient blue or white LEDs, or renewable solar energy. VLR-photocatalysts could facilitate the development of the Photocatalytic Oxidation (PCO) technology for use in ISS air revitalization and water recovery systems, reduce the overall life cycle costs of such systems, and potentially revolutionize air and water recovery systems by integrating VLR-PCO into habitat structures (e.g. space wall). Success of the research ...

Read more on the last page.



DETAILED DESCRIPTION

This project focused on the development of novel photocatalysts, using multiple preparation methods, to be utilized in air and/or water purification reactors. Developed catalyst samples were tested for both applications and underwent vigorous physical characterization. Top-performing samples were also compared to commercially available visible light responsive (VLR) catalysts. While photocatalysis is a well-developed technology for both air and water purification, most processes use bare titanium dioxide as the catalyst, which requires UV light for activation. By altering the wavelength of light needed for activation, solar radiation or highly-efficient LEDs can be better utilized while eliminating hazardous Hg-containing fluorescent lamps.

MANAGEMENT

Program Executive:
John Falker

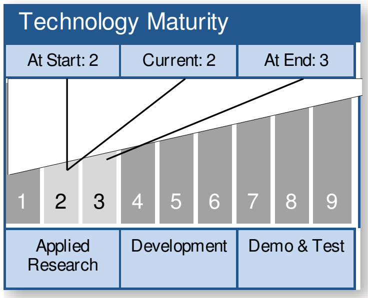
Program Manager:
Nancy Zeitlin

Project Manager:
Raymond Wheeler

Principal Investigator:
Paul Hintze

TECHNOLOGY DETAILS

Visible Light Responsive Catalyst for Air & Water Purification



TECHNOLOGY DESCRIPTION

Investigate and develop viable approaches to render the normally UV-activated TiO2 catalyst visible light responsive (VLR) and achieve high and sustaining catalytic activity under the visible region of the solar spectrum.

This technology is categorized as a hardware system for other applications

- Technology Area
    - TA06 Human Health, Life Support & Habitation Systems (Primary)

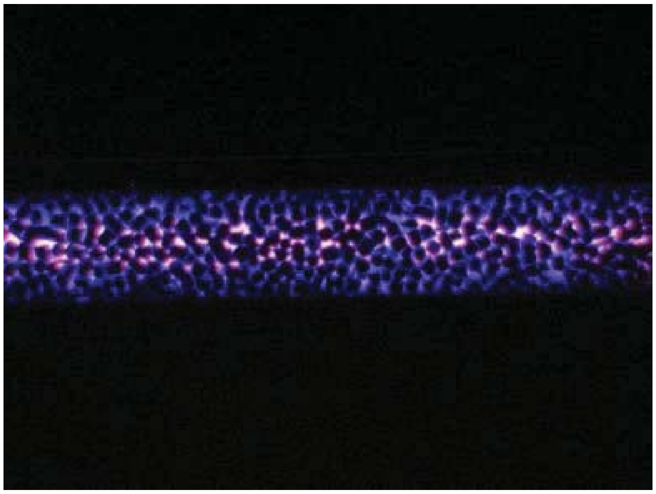
CAPABILITIES PROVIDED

Capabilities for a rapid screening method for VLR catalysts in both the aqueous and gas phase were developed and implemented, methodology for sampling and limited physical characterization was devised, and a basis of understanding various dopant trends for creating a VLR catalyst is currently being evolved from experimental results.

VLR-catalysts eliminate the hazards associated with UV radiation, enable the use of long lasting and highly efficient blue or white LEDs, or renewable solar energy. VLR-photocatalysts could facilitate the development of the Photocatalytic Oxidation (PCO) technology for use in ISS air revitalization and water recovery systems, reduce the overall life cycle costs of such systems, and potentially revolutionize air and water recovery systems by integrating VLR-PCO into habitat structures (e.g. space wall). Success of the research could also enhance technologies for the indoor air quality control (e.g. managing “sick building syndrome”).

Performance Metrics		
Metric	Unit	Quantity
Appreciable Activity	10	45

IMAGE GALLERY



Visible Light Responsive Catalyst for Air & Water Purification

ANTICIPATED BENEFITS

To NASA funded missions: (CONT'D)

could also enhance technologies for the indoor air quality control (e.g. managing “sick building syndrome”).