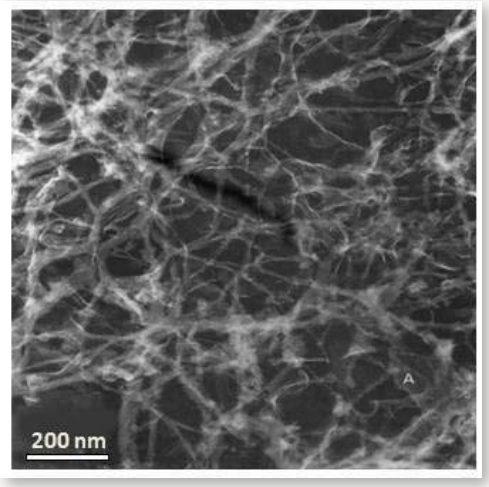
Protein Colloidal Aggregation Project

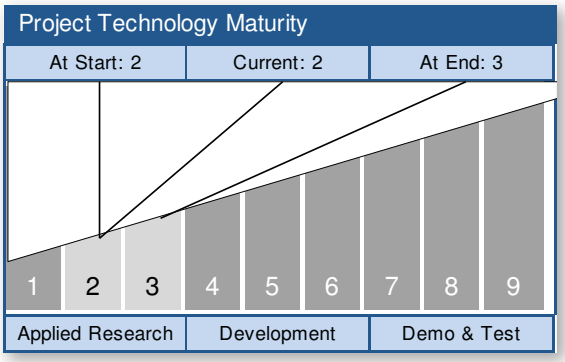
Center Innovation Fund: KSC CIF Program

Space Technology Mission Directorate (STMD)

National Aeronautics and Space Administration



Protein Colloidal Aggregation



ABSTRACT

To investigate the pathways and kinetics of protein aggregation to allow accurate predictive modeling of the process and evaluation of potential inhibitors to prevalent diseases including cataract formation, chronic traumatic encephalopathy, Alzheimer's Disease, Parkinson's Disease and others.

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

ANTICIPATED BENEFITS

To NASA funded missions:

The project is scheduled to fly on Nanoracks in September 2014.

To other government agencies:

Potential to understand the mechanism for several diseases in the US and world population including chronic traumatic encephalopathy, Parkinson's Disease and Alzheimer's Disease.

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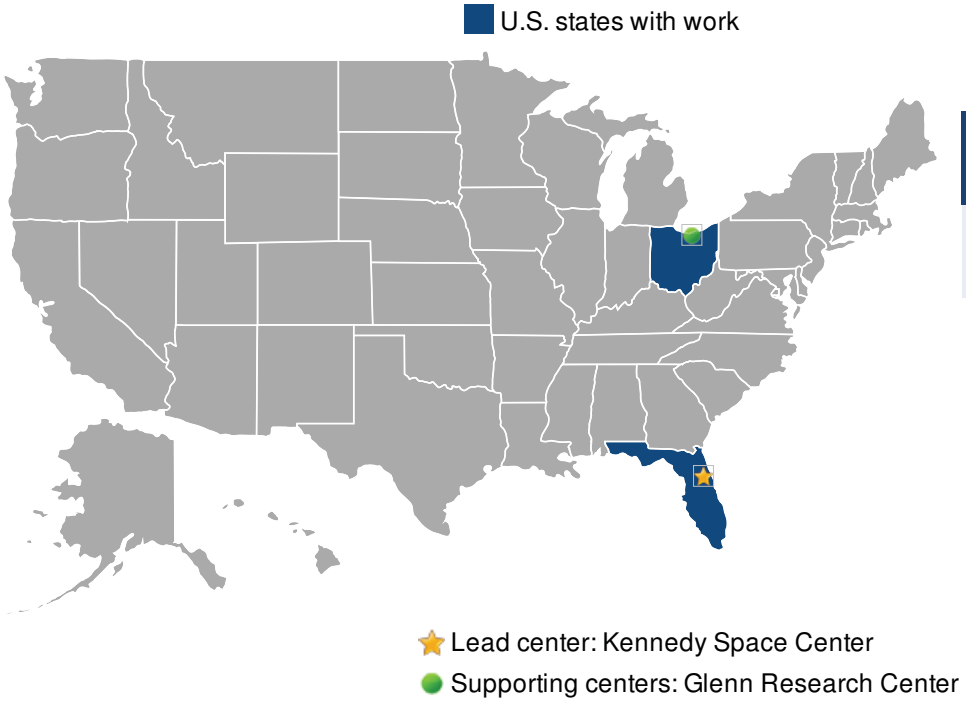
Read more on the last page.



Other Organizations Performing Work
Florida Institute of Technology (FIT)

DETAILED DESCRIPTION

The goal of the Protein Colloidal AggregationProject is to understand the underlyingcause of several major diseases, includingAlzheimer's, Parkinson's, and chronictraumatic encephalopathy. These diseasesall occur when protein molecules undergoa peculiar and irreversible process in whichthey aggregate to form tiny fibers of a uniquematerial called amyloid, which the bodycannot remove.Despite enormous investment in research,the fundamental physiochemical mechanism ofthese diseases remains poorly understood.Finding an optimal treatment for any diseaseis impossible until we fully understand itscause. We believe the central problem inobtaining this understanding is that themost commonly proposed models for amyloidaggregation may be incorrect, and that theprocess is not fundamentally biological.

MANAGEMENT

Program Executive:
John Falker

Program Manager:
Nancy Zeitlin

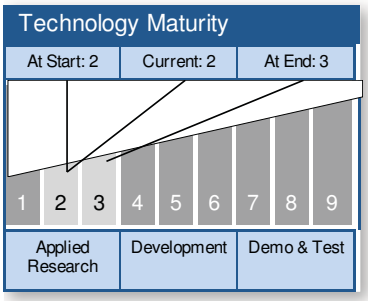
Project Manager:
David Tipton

Principal Investigator:
David Tipton

Co-Investigator:
Daniel Woodard

TECHNOLOGY DETAILS

Mechanisms and Techniques to Study Protein Colloidal Aggregation and Its Effects



TECHNOLOGY DESCRIPTION

- The goal of the Protein Colloidal Aggregation Project is to understand the underlying cause of several major diseases, including Alzheimer's, Parkinson's, and chronic traumatic encephalopathy. These diseases all occur when protein molecules undergo a peculiar and irreversible process in which they aggregate to form tiny fibers of a unique material called amyloid, which the body cannot remove. Despite enormous investment in research, the fundamental physiochemical mechanism of these diseases remains poorly understood. Finding an optimal treatment for any disease is impossible until we fully understand its cause. We believe the central problem in obtaining this understanding is that the most commonly proposed models for amyloid aggregation may be incorrect, and that the process is not fundamentally biological.
- This technology is categorized as a hardware system for other applications
- Technology Area
    - TA06 Human Health, Life Support & Habitation Systems (Primary)

CAPABILITIES PROVIDED

The use of atomic force microscopy and scanning electron microscopy in the evaluation of protein colloidal aggregates and macromolecular networks

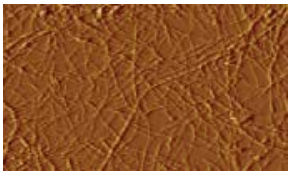
1. The capability to observe colloidal aggregation of proteins in microgravity.
2. The effects of macromolecular network formation on biological transport processes.
3. The use of atomic force microscopy in the evaluation of the nanostructure of bone and artificial composite...

TECHNOLOGY DETAILS

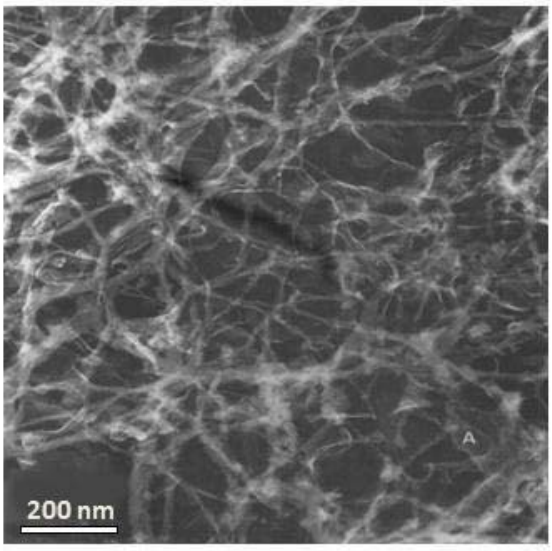
POTENTIAL APPLICATIONS (CONT'D)

materials.

IMAGE GALLERY



AFM Image



Protein Colloidal Aggregation

SEM Image

ANTICIPATED BENEFITS

To the nation: (CONT'D)

Potential to understand the mechanism for several diseases in the US and world population including chronic traumatic encephalopathy, Parkinson's Disease and Alzheimer's Disease.