Institute for Ultra-Strong Composites by Computational Design

Vision statement

Serve as a focal point for partnerships between NASA, other agencies, industry, and academia to: (1) enable computationally-driven development of CNT-based ultra high strength lightweight structural materials within the Materials Genome Initiative (MGI) paradigm and (2) expand the resource of highly skilled engineers, scientists and technologists in this emerging field

Research objectives

- Develop a novel ultra high strength lightweight structural material for use in deep space exploration vehicles
- Establish a new computationally-driven material design paradigm for rapid material development
- Develop modeling, processing, and testing tools and methods for carbon nanotube based material systems

Leadership team

Greg Odegard, Michigan Tech, Director, SDT Team Leader
Richard Liang, Florida State, Deputy Director, MST Team Leader
Mike Czabaj, University of Utah, TCT Team leader
John Hart, Massachusetts Inst of Tech, MMT Team leader

University members

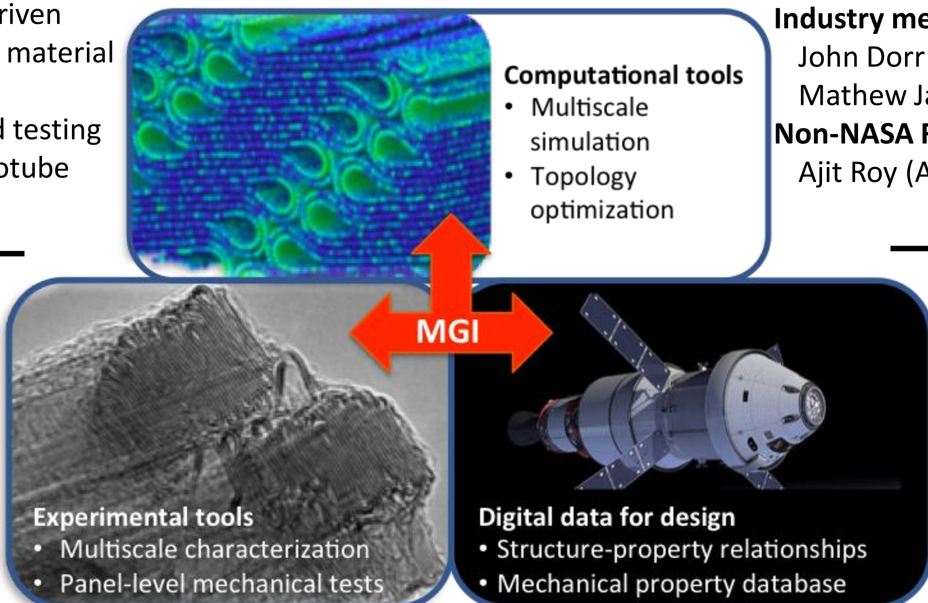
Dan Adams, Tarik Dickens, Traian Dumitrica, Susanta Ghosh, Jamie Guest, Ibrahim Guven, Ayou Hao, Hendrik Heinz, Julie King, Satish Kumar, Okenwa Okoli, Ravi Pandey, Jin Gyu Park, Trisha Sain, Ashley Spear, Adri van Duin, Brian Wardle, Chad Zeng

Industry members

John Dorr (Nanocomp)
Mathew Jackson (Solvay)

Non-NASA Federal lab partner

Ajit Roy (Air Force Research Lab)



Approach

The institute is organized into four teams that will work work collaboratively to achieve the research objectives:

- The Simulation and Design Team (SDT) will establish structure-property relationships and new material design methodologies
- The Materials Synthesis Team (MST) will pioneer precise patterning synthesis techniques and optimize interphases for material performance enhancement
- The Material Manufacturing Team (MMT) will focus on the scale-up manufacturing of highly aligned and concentrated CNT composites
- The Testing and Characterization Team (TCT) will conduct multiscale characterization of the CNT composites and develop new test methodologies to explore this new class of materials

Benefits

Provide NASA and aerospace community with:

- Ultra high strength, lightweight material systems
- Innovative computationally-accelerated materials development paradigm for a wide range of optimal materials design
- New university/industry/federal laboratory partnerships that can lead to future technological advances
- Convenient one-stop shop for cutting edge materials development expertise and numerical tools developed by the team
- Pool of trained diverse emerging researchers with talents that can contribute to the materials development workforce
- Global competitive edge in the development of novel materials for future aerospace applications