Small Business Innovation Research/Small Business Tech Transfer

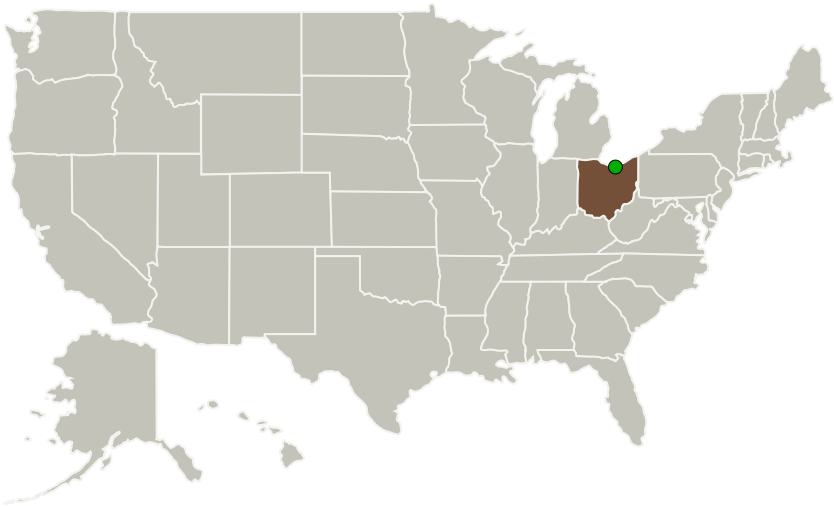
High Performance Carbon Nanotube Based Conductors, Phase I

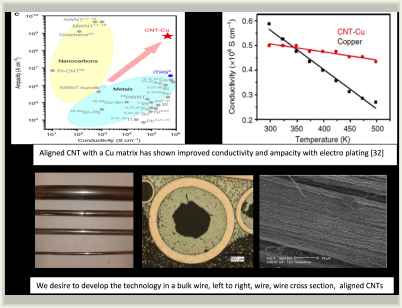
Completed Technology Project (2015 - 2015)

Project Introduction

This proposal is for the development of conductors with improved electrical conductivity and/or ampacity better than copper or aluminum. Electrical conductors are key components for just about every power device or system. Copper is presently the conductor of choice, based on high performance, low cost, and ease of use. However, increasing demands for power and data push the need for more capacity, and the total contribution of electrical conductor weight to the system has become significant in aircraft, ships, rail, and automobiles. Thus, the development of a commercial, low-cost, light-weight, highly conductivity wire is an important objective to improve energy efficiency and reduce the weight/amp of power. In this Phase I and eventual Phase II we propose the development for carbon nanotube (CNT) metal based current carrying composites. We will focus on CNT additions to two base metals, Cu and Al, and the composites made with them as base metals. We will focus on composites that have a high density of carbon nanotubes. Our objective is developing methods to functionalize the connection between carbon nanotubes such that the connections have low resistance. We will focus on the properties of conductivity, and ampacity (maximum current which can be carried per area of cross section). Our focus will be demonstrating methods of improvement in Phase I and optimization of the best options in Phase II and also fabrication of long length wires in a Phase II effort.

Primary U.S. Work Locations and Key Partners





HIGH PERFORMANCE CARBON NANOTUBE BASED CONDUCTORS, Phase I

Table of Contents

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

High Performance Carbon Nanotube Based Conductors, Phase I

Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
Hyper Tech Research, Inc.	Lead Organization	Industry	Columbus, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations
Ohio

Project Transitions

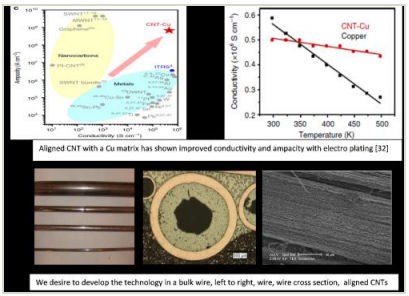
June 2015: Project Start

December 2015: Closed out

Closeout Summary: HIGH PERFORMANCE CARBON NANOTUBE BASED CONDU CTORS, Phase I Project Image

Closeout Documentation:
- Final Summary Chart Image*(https://techport.nasa.gov/file/139053)*

Images



Briefing Chart Image
HIGH PERFORMANCE CARBON NANOTUBE BASED CONDUCTORS, Phase I
(https://techport.nasa.gov/image/135676)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Hyper Tech Research, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

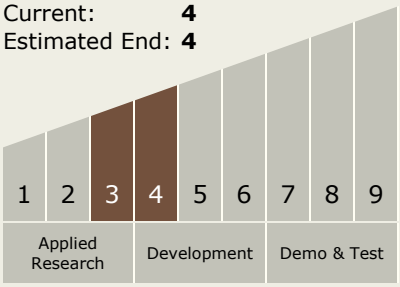
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Michael J Tomsic

Technology Maturity (TRL)

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



Technology Areas

Primary:

- TX01 Propulsion Systems
  └ TX01.3 Aero Propulsion
    └ TX01.3.9 Hybrid Electric Systems

Target Destinations

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