



Project Fact Sheet

Program

2009 Ultra-Deepwater

Project Number

09121-3300-10

Start Date

May 2011

Duration

37 Months

RPSEA Share

\$1,975,000

Cost Share

\$500,000

Prime Contractor

Los Alamos National Laboratory

Participants

Chevron

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Reports and Publications

www.rpsea.org/projects/09121-3300-10

Development of Carbon Nanotube Composite Cables for Ultra-Deepwater Oil and Gas Fields

Research Objectives

The objective of the proposed project was to double the electrical conductivity of CNT-copper composites and establish a method to extend the composite to 100 meters while maintaining (or improving) physical characteristics.

Approach

One goal of this work was to develop a scalable manufacturing process whereby the enhanced electrical conductivity properties of carbon nanotubes can be incorporated into a copper-based composite. The approach taken was to use carbon nanotubes (CNTs) dispersed within a solution and dip-coat this solution onto a Cu wire former. This green coating was then shaped and reduced and the CNTs within the coating aligned to the copper former with conventional wire drawing techniques.

Accomplishments

Experimentally, we have developed an efficient method for dispersing the CNTs in solutions suitable for dip-coating. The solution-coating and wire drawing steps have been shown to produce highly-aligned, dense CNT coatings. The composite wires have resistivities that are close to Cu. The resistivities of the CNT coatings themselves are among the lowest reported to date by any research group world-wide.

Significant Findings

A key understanding from this work was the demonstration that mechanical deformation, in this case wire drawing, can significantly benefit CNT conductors through reductions in porosity and improved CNT alignment.

Future Plans

Although we have made significant progress in developing an advanced CNT-based conductor, our progress was not enough to satisfy an aggressive set of milestones and the work did not proceed into Phase III. We are currently working towards transitioning the technology into industry where opportunities arise and exploring other funding opportunities to continue development of this advanced wire technology, especially where lightweighting is a significant concern.

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