

NASA SBIR/STTR Technologies

Silicon Whisker and Carbon Nanofiber Composite Anode

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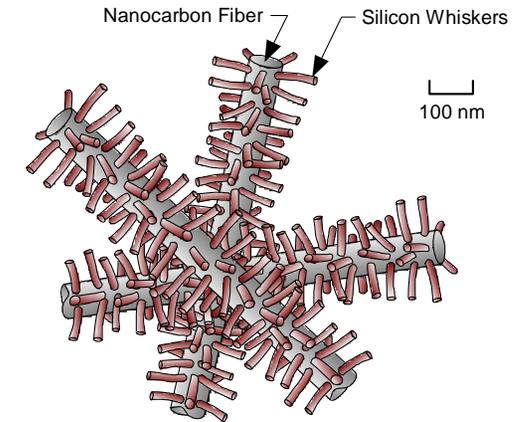
Proposal No.: 08-1 X6.02-9113



Identification and Significance of Innovation

Physical Sciences Inc. (PSI) proposes to develop a silicon whisker and carbon nanofiber composite anode for lithium ion batteries. The nanocomposite design provides a synergistic improvement in reversible capacity and electrochemical cycling as a result of the unique silicon architecture and structural reinforcement provided by the nanofibers.

Expected TRL Range at the end of Contract (1-9): **3**



Silicon Whiskers/Nanowires on Carbon Nanofiber J-8382

Technical Objectives and Work Plan

1. Demonstrate silicon whisker on carbon nanofiber composites with 1:1 weight ratio.
2. For an anode in half cell, demonstrate a capacity of greater than 1000 mAh/g based a C/2 charge/discharge rate and an irreversible loss of <10% for the 1st cycle.
3. Demonstrate a cycle life of over 100 cycles with less than 20% capacity fade.
4. In a lithium ion battery, achieve an anode capacity greater than 950 mAh/g at C/2 and 0°C.

Work Plan Tasks: reporting; material synthesis; electrode fabrication; half cell and full cell electrochemical testing;

NASA and Non-NASA Applications

NASA applications: for both orbital and planetary surface missions include the Lunar Lander or Lunar Surface Access Module (LSAM), robotic missions, and surface systems. Surface systems include human habitats, Extravehicular Activities (EVA), science measurements, and the utilization of in situ resources

Non-NASA applications: hybrid electric vehicles and consumer electronics devices

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NON-PROPRIETARY DATA