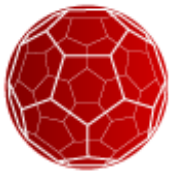

THERMONEUTRONICS

Summary of Technology Initiatives

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Introduction

Advances in science and engineering have changed our world.

For example, rudimentary propeller airplanes gave way to high performance propeller aircraft which gave way to jet engine aircraft, missiles, rockets, and lunar landing modules.

In perhaps an even greater way, nano technology will change the world. It is changing the world as you read this document, but it will materially change the world in the future.

ThermoNeutronics will become part of that change mechanism, by introducing radically different nano technology into rapidly changing solar energy and related markets, by offering Generation III solar and associated technology.

Generation I is the conventional silicon-based solar cells that have evolved over the past decades, and are widely deployed. Generation II is the advent of the use of film, nano, and other technologies in an attempt to overcome inherent limitations of Generation I technology.

ThermoNeutronics' technologies are best termed "next generation, Generation III."

Our developmental technologies have been patented by Dr. Somenath Mitra and others, and include:

- **Carbon nanotube organic photovoltaic technology (CNT-OPV)**
- **Carbon nanotube infrared light based organic photovoltaic technology (CNT-IR-OPV)**
- **Carbon nanotube glare / shading control technology (CNT-GSC)**
- **Carbon nanotube thermal circuitry (CNT-TC)**
- **Carbon nanotube alkaline battery technology (CNT-AB)**
- **Carbon nanotube lithium rechargeable battery technology (CNT-LRB)**
- **Carbon nanotube membrane desalination technology (CNT-MD)**
- **Proprietary integration of these emerging technologies**
- **Morphilm®**
- **Innovative motor design (CNT-IMD)**
- **Thermal circuitry and thermo-neutronic applications (TC / TN)**

What is This Technology?

Carbon nanotubes are unique, one-dimensional systems of pure carbon (graphene) with technology disruptive optical, mechanical, and electrical properties. To grasp this technology, think in terms of "how small is small" — specifically, things that are several nanometers in size. A single nanometer is equivalent to 0.00000003937 (3.937 10e-8) inches. Conversely, one inch is 25,400,000 nanometers.

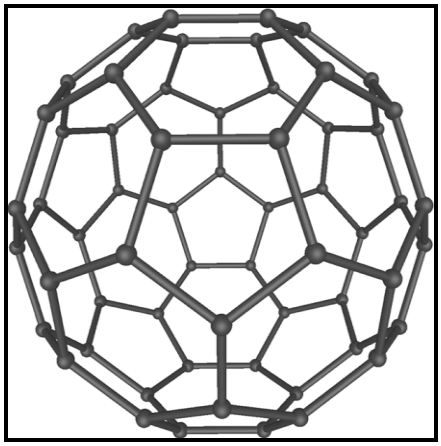
Some typical nanotube configurations are shown below.

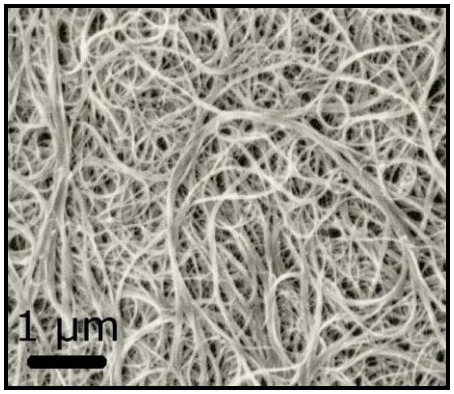
Carbon graphene can be rolled into "tube-like" configurations that have diameters on the order of 1 to 100 nm and lengths of 1 nm to almost 20 centimeters in length (about 8 inches). They can be arranged on this micro-scale in all sorts of configurations, ranging from the simple to extremely complex. They can be integrated with other chemical substances to enhance their properties.

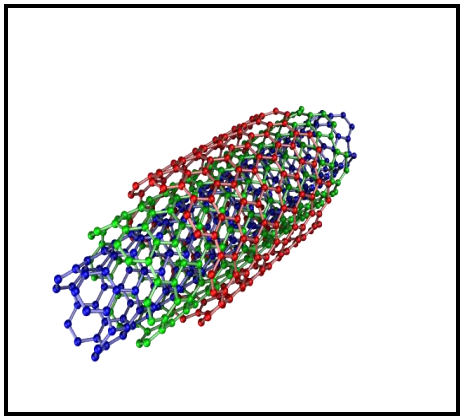
Carbon nanotubes are the strongest and stiffest materials discovered to date in terms of tensile strength and elasticity. They have more than 1000 times the conductivity of copper or aluminum wire. They can be configured to absorb or block electromagnetic radiation, such as radar. They can be configured as good thermal insulators, or as good thermal conductors. They can be used to fabricate solar cells, and batteries, and to treat water.

So what can you do with all of this?

The bottom line — scientists and engineers are using this micro-sized technology to do things that conventional, visible technology cannot do. For example, in 2011, scientists and engineers built the world's smallest rotational electric motor. The motor was about 1 nm in diameter.







Various Carbon Nanotube Configurations (in Micro-Scale):
Single C_{60} BuckyBall, Nano Bundles, and Triple Wall Armchair Nanotubes

Markets for ThermoNeutronics' Technology

There is a flurry of research and development, commercialization, and investment in nano-technology. With leap-frogging technology, the world is rapidly changing from conventional technologies to new emerging technologies that create vast new markets and materially change the world in which we live.

The primary markets for technologies envisioned by ThermoNeutronics are enormous. This is critical in assessing the viability of our technologies since the development of high tech solutions for limited applications may not necessarily make sense, except possibly for "boutique" applications, such as space exploration and medicine.

Energy Sector

On the other hand, huge markets exist that can accommodate new CNT-based technologies. For example, the application of solar power systems has greatly increased over the past decade, but the cost of solar energy is still expensive, relative to conventional base-load fossil fueled power plants. However, with Generation III technology, that could well change, with CNT technology providing more economical power systems that could be even more economical than conventional power generation.

ThermoNeutronics' CNT-OPV, CNT-IR-OPV, CNT-AB, and CNT-RLB patented technologies offer huge opportunities in the energy sector by providing Generation III solar and battery technologies. These systems provide for higher overall electrical yields and efficiencies, which, in turn, lead to lower overall installation and energy production costs.

Imagine solar systems that capture sunlight energy during cloudy or nighttime conditions. And, imagine solar cell and battery systems that are the size of a postage stamp, and that can be printed in the field using a conventional ink jet printer.

Residential and Commercial Buildings Sector

When integrated with other technologies such as thermo-neutronics and heat circuitry, the application of CNT-based solar and battery technologies offer enormous opportunities in both residential and commercial building construction. Decades ago, single-pane glass windows were the norm. Today, multi-pane windows and solar window films have widespread application throughout the world due to their energy saving properties. CNT-based technology will only expand and enhance those applications.

ThermoNeutronics' CNT-GSC, thermal circuitry, and thermo-neutronics technologies offer opportunities in building construction by providing the next generation technology.

Imagine window films that not only block the sun, but capture energy from the sun to generate electricity for the building, and store that energy for nighttime use, and also have the ability to utilize shading control for optimum use of sunlight conditions throughout the year, and throughout the day.

Water Purification and Desalination Sector

Along with energy, the availability of pure drinking water is the greatest challenge in the world. CNT-based technologies offer significant advantages over conventional technologies such as reverse osmosis in terms of smaller size, lower capital cost, reduced fouling, lower electricity requirements, and superior economics. As such, this technology may lead to economical desalination of brackish and seawater, providing much needed water for agriculture and human consumption.

ThermoNeutronics' CNT-MD offers exciting cutting edge technology that can be developed and scaled for small residential and large commercial desalination systems. The technology also has tremendous application in industry, for example, the treatment of frack water and produced water in oil and gas environments.

Imagine the impact of CNT-based technology in the water treatment sector, that would provide additional water resources as a result of more effective and efficient technology.

Innovative Electric Motor Design

ThermoNeutronics has teamed with the inventor of a high efficiency electrical motor. CNT conductors can be incorporated into the motor windings. Imagine a motor the size of a coffee cup with the same horsepower as a conventional motor the size of a gallon milk jug. The potential market is enormous, ranging from hair dryers to washing machines to large industrial motors.

The Three Pillars of Commercialization

The business goal of ThermoNeutronics is to develop commercial energy and related products using CNT, thermal circuitry, and thermo-neutronic technologies. Our technical approach associated with the development of such products will involve three primary pillars of activities, essentially at the nano, macro, and full-scale levels:

- **Pillar I – Research**

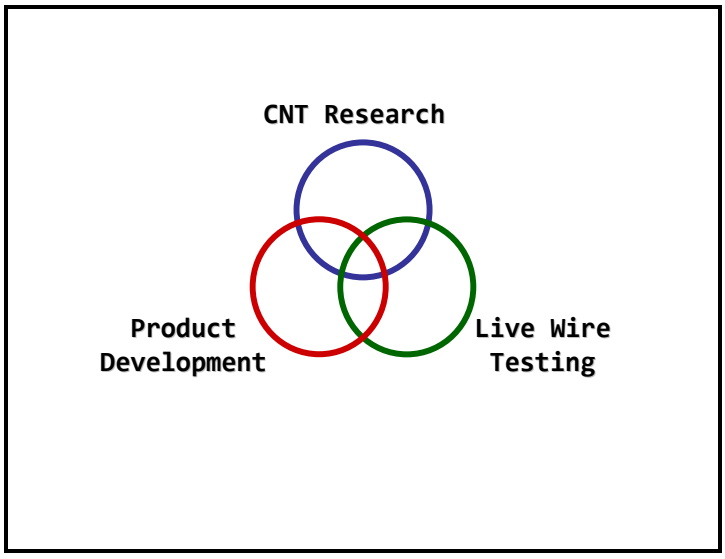
  Pillar I is the continued research of CNT technology in order to improve CNT performance in terms of functional properties and metrics, and involves the laboratory testing of various CNT formats.

- **Pillar II – Development**

  Pillar II is the continued development of CNT technology in terms of functional properties and metrics that are commensurate with current and future applications. This includes the integration of CNT technology with thermal circuitry, thermo-neutronics, and other technologies.

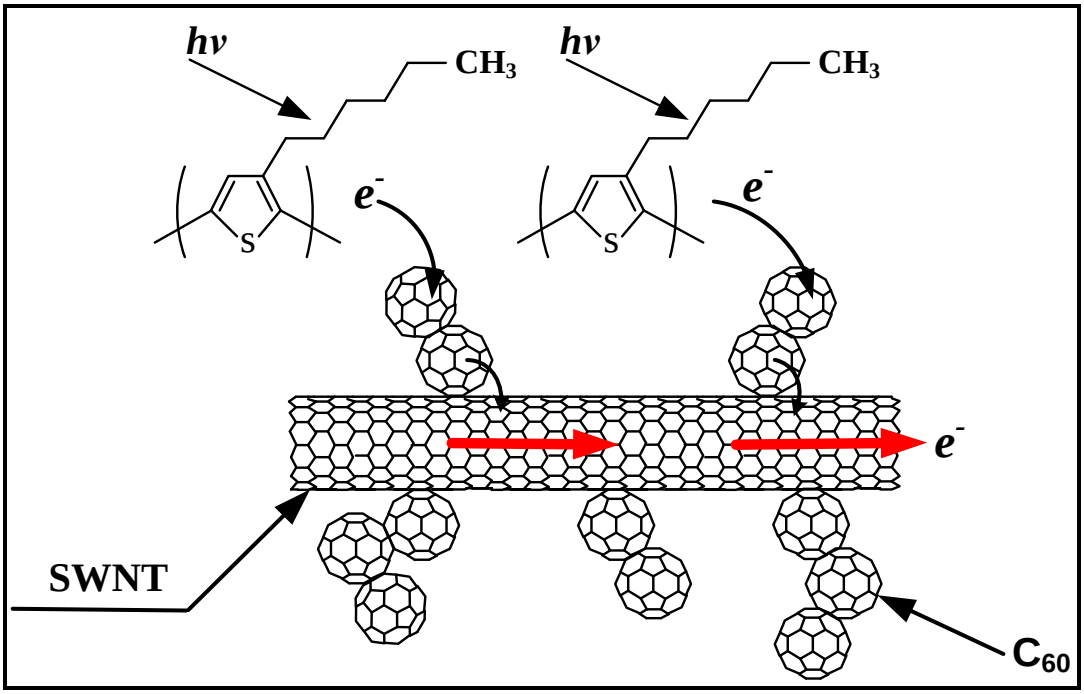
- **Pillar III – Live Wire Testing**

  Pillar III is the "live wire" testing of various CNT formats and configurations to demonstrate performance for commercialization. This will involve technical performance, reliability, durability, constructability, scale-up, economic, and other metrics.


CNT Research
Product Development
Live Wire Testing

The Technology Highlights

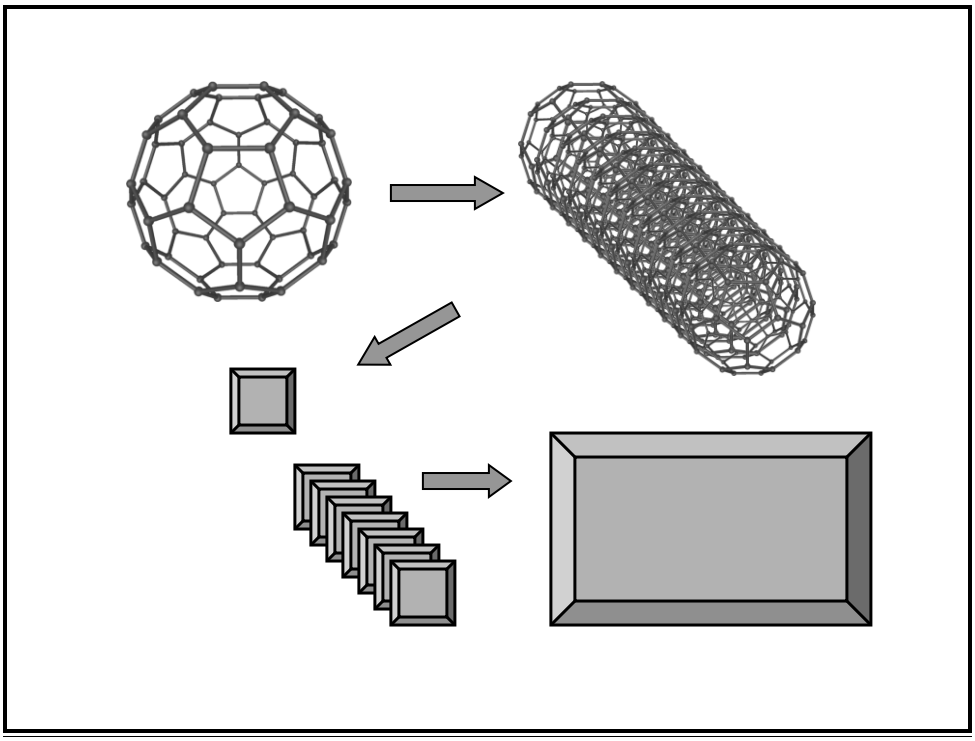
The following diagrams capture some of the ThermoNeutronics' technology highlights.



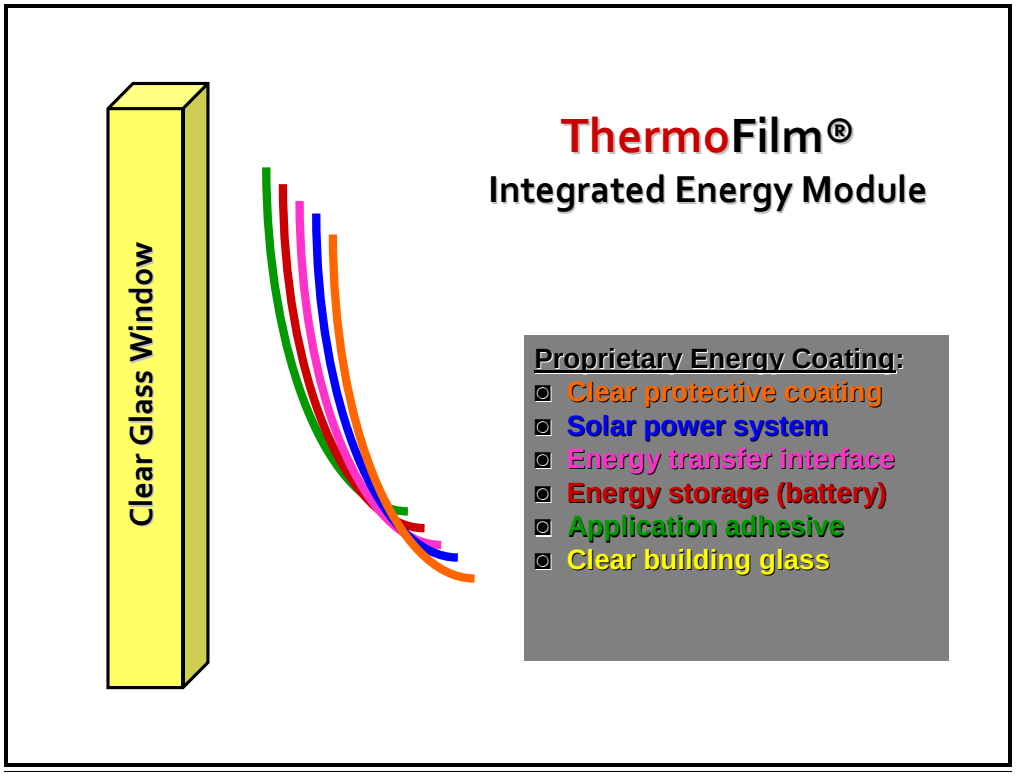
Conceptual Diagram of Attachment of C_{60} Clusters on the Sidewall of Carbon Nanotubes, Which Generate Electricity When Subject to Light Irradiation

CNT Photo Voltaic Cell Representative of Solar Generation III Technology

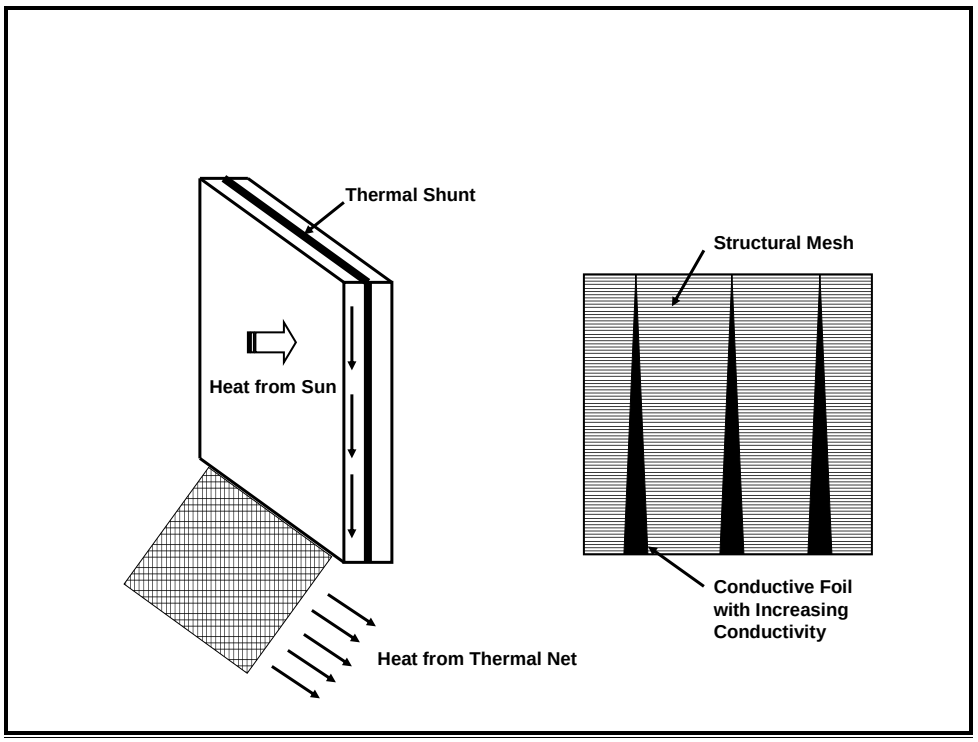
CNT Electrical Battery Representative of Solar Generation III Technology



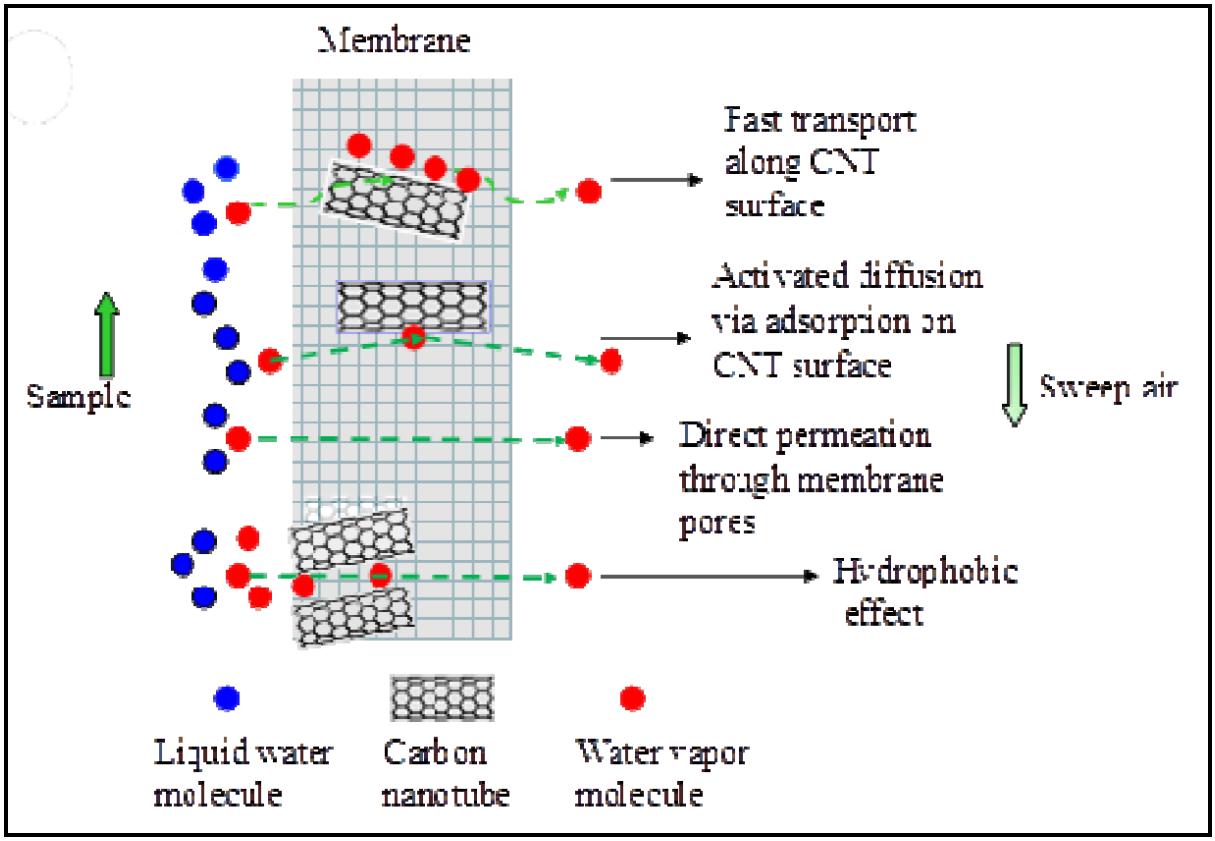
Scaling from Nano to Macro to Commercially-Sized Functional Devices



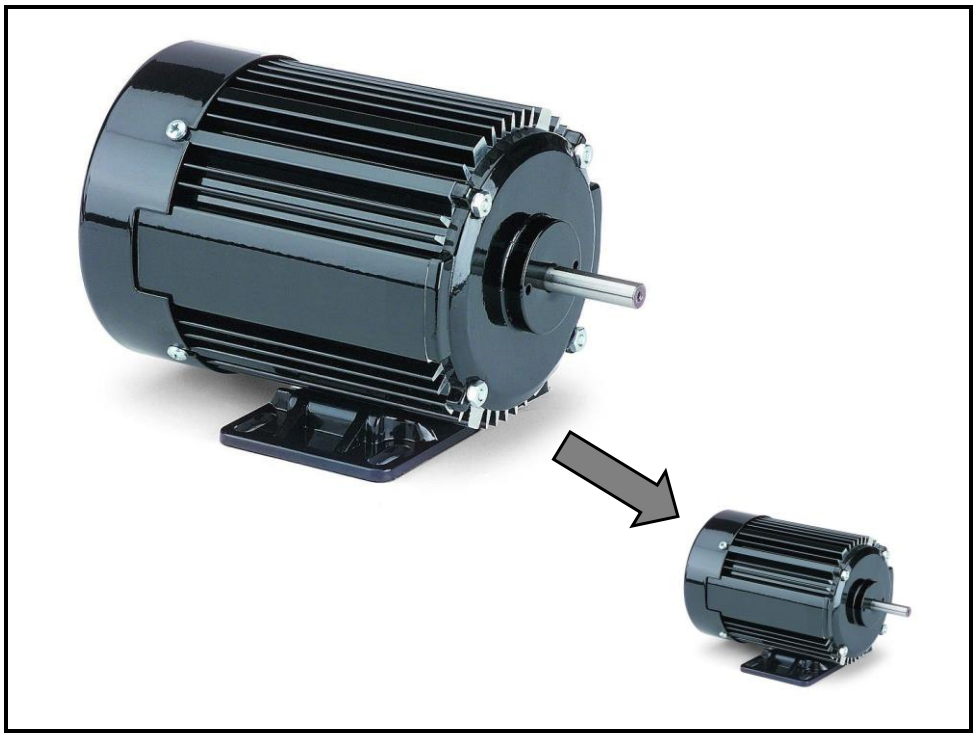
The "Holy Grail" of CNT Solar Energy Systems:
An Integrated System to Control and Block Sunlight,
and to Produce and Store Electricity



Use of Thermal Circuitry and Thermo-Neutronics:
Energy Efficient Building Design



CNT Membrane Technology for Desalination of Seawater



Innovative Motor Design Using Special Technology and CNT Windings: Same Horsepower, But One-Tenth the Size

Summary of Technology Initiatives

Device or Product	Remaining Tasks
Carbon nanotube organic photovoltaic technology (CNT – OPV)	Current design is at 3-4% efficiency. R&D geared to increase efficiency to 8-12% and increase power output, reduce production costs by working with existing manufacturing processes to mass produce, and develop field application technology for retrofits.
Carbon nanotube infrared light based organic photovoltaic technology (CNT – IR – OPV)	Current research of quantum dots and related technology to add near-IR and UV to the visible light spectrum of OPV cells, thereby potentially doubling the efficiency of current OPV technology. Also research of potential to spray on other PV systems to increase their useful efficiency during cloudy or no-sun periods.
Carbon nanotube glare and shading control technology (CNT – GSC)	Research the thickness and consistency of film to control or eliminate glare by relative percentage of shading, substrate separation, and ability to combine with other modules.
Carbon nanotube thermal circuitry technology (CNT – TC)	Divide work into nano, micro, and macro scale efforts to support particular CNT devices, such as solar power and battery systems.
Advanced alkaline carbon nanotube battery technology (CNT – AB)	R&D is currently 80% complete. Additional work to move to 100% completion, increase power density, create prototype, field test, perfect spray-on manufacturing techniques, and identify first market products. Products range from mobile devices to backup systems to films.
Advanced lithium carbon nanotube rechargeable battery technology (CNT – LRB)	Apply alkaline research to lithium ion, solve the differences in formulation and application, create prototype, field test, improve spray on or roll on manufacturing technique, and identify first market products.
Proprietary integration of these technologies into printable film (IT – PF)	Concurrent with all other development but will require research to determine which combination of modules are most compatible and what substrate separation will be required.
Thermal Circuitry and Thermo-Neutronics (TC-TN)	Concurrent with all other development but will require research to determine which combination of modules are most compatible and what substrate separation will be required.
Morphilm®	Develop morphing and gradient technologies to be used in conjunction with TC-TN technology.
CNT Electrical Conductor	Team with identified CNT skunk works company to develop Generation II

(CNT – EC)	CNT conductors, including low voltage and high voltage conductors.
Innovative Motor Design (CNT-IMD)	Continue development work and produce working test models. Work on CNT electrical conductor design, and incorporate into the motor windings.
CNT Membrane (CNT-MD)	Current system design is several ounces per minute. Additional R&D required to determine scale-up metrics, and complete the design, including auxiliary systems.

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