

SPACE POWER SYMPOSIUM (C3)
Space-Based Solar Power Architectures / Space & Energy Concepts (1)

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WINNING PAPER OF THE 4TH SPS PAPER COMPETITION: CARBON-NANOTUBE BASED
SPACE SOLAR POWER (CASSP)

Abstract

Single Walled Carbon Nanotubes (SWCNT) are a product of advancements made in the field nanotechnology. Nanotubes exhibits a high tensile strength, high thermal electrical conductivity, excellent field emission, radiation resistance and is an ideal diode. The latter property makes them one of the lucrative solar cell material available. The former properties make it ideal for use in a space environment and has been studied extensively for over 20 years. Recent advances in SWCNT manufacturing at NoPo, Bangalore, India, have made it possible for the material to be applied in real world applications at considerable costs. Usage of SWCNT based solar cells and electron emitters would substantially reduce the mass of energy harnessing systems by eliminating radiation shields, protection barriers and reducing weight of support structures microwave transmitters. This is possible due to the inherent properties of the material. We make a case for space based solar power with a 50MW satellite that would weigh about 115tons if its core components were made of SWCNT. A modular design allows for this system to be built to full capacity over time using existing launch options at a cost of US\$ 340 Million. The system would be profitable within 2 years of launch.