

## **Progress of Carbon-based Materials Research in the Philippines for Energy Harvesting and Storage and Other Potential Applications**

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### **ABSTRACT**

We report on our research progress utilizing two types of carbon-based materials for use as energy storage and energy harvesting devices. Our current work focuses on carbon nanotubes (CNT) for solar cell applications and graphene as electrochemical capacitors. High quality CNTs are synthesized via chemical vapor deposition using ethanol as a precursor. The solar energy harvester is prepared through a CNT-silicon heterojunction, with an expected power efficiency of greater than 15%. Graphene is obtained through the reduction of graphene oxide by laser irradiation. Such graphene has a high surface area and is used as electrodes for electrochemical capacitors in order to store electrical energy.

We also explore other potential applications of carbon nanotubes and graphene. Carbon nanotubes have very good thermal conductivity, which makes them potential candidates for thermoelectric device applications. Furthermore, both CNT and graphene can be used either for water filtration and desalination. We will present all these work and their potential in the context of Philippine research and development.

**KEYWORDS:** carbon nanotubes; graphene; solar cell; electrochemical capacitor; thermoelectric device; water filtration; desalination