

## NANOTUBES THAT ASSEMBLE THEMSELVES

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**Fig. 1 Structure of Fullerenes**

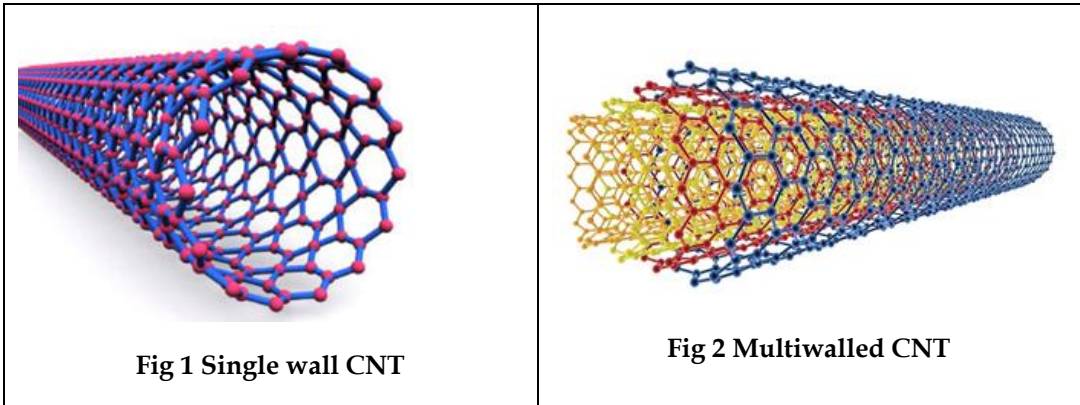
## **TYPES OF CARBON NANOTUBES:**

### **1. Single-walled Carbon Nanotubes**

It is represented as SWCNT. The Single-walled Carbon nanotubes exist in a 1-d structure. Some examples of Single-walled CNT are armchair and zig-zag Single-walled Carbon nanotubes.

#### **Properties of Single-walled Carbon Nanotubes are:**

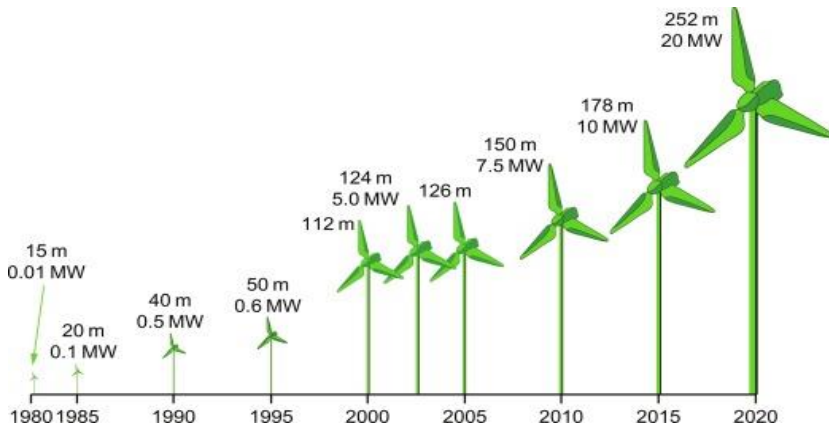
- The diameter of Single-walled Carbon nanotubes is 2nm.
- The length of Single-walled Carbon nanotubes is around 2 micrometers.
- They exist in a one-dimensional structure. Therefore, it is also known as a nanowire.



## 2. Properties and application:

### Carbon Nanotubes Properties:

1. CNTs have high thermal conductivity
2. CNTs have high electrical conductivity
3. CNTs aspect ratio
4. CNTs are very elastic ~18% elongation to failure



**Fig. 3 Nanotubes are used in Windmill blades**

### 3. Filtration:

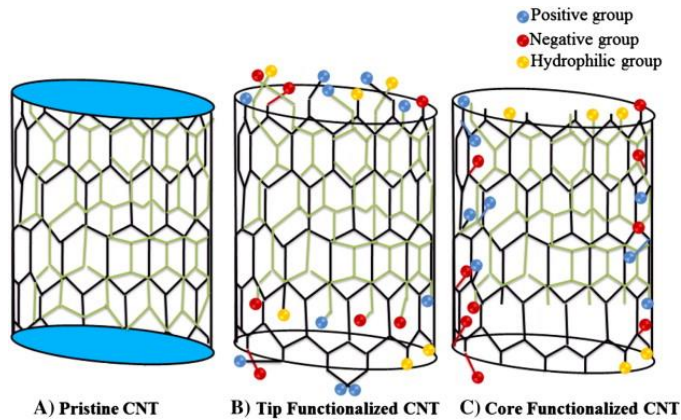


Fig. 4 Functionalization of CNT

### 4. Carbon nanotubes as Nano cylinders:

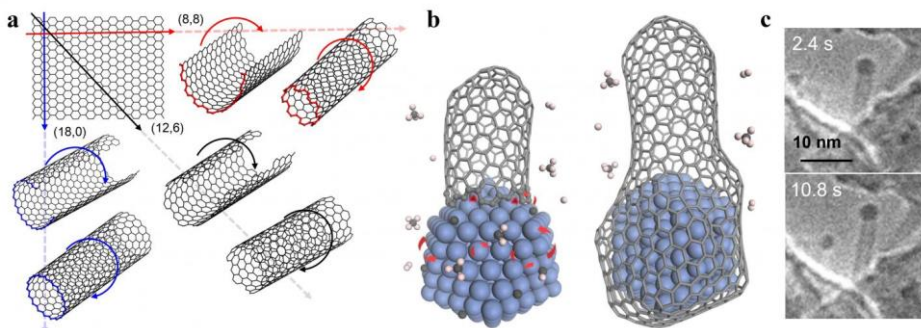


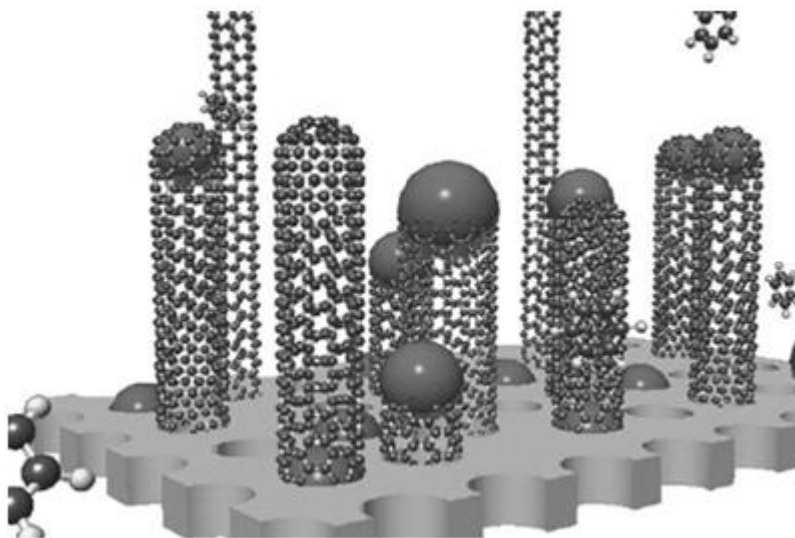
Fig. 5 Various orientations of CNTs

### 5. How is carbon nanotubes made?

Three main methods are currently available for the production of CNTs:

- Arc discharge
- laser ablation of graphite, and
- Chemical vapor deposition (CVD).

6. CVD process:



**Fig. 5 Synthesis of CNT with the CVD process**

**SUMMARY**

In this work, we described the composite of a well-defined nanostructure, consisting of multiple components composed of SWNT coated with a NDI nanotube compound, and later coated with a PPE-SO<sub>3</sub>Na polymer layer. We have shown that the centralized medium nanotube compounds receive a sub-hydrophobic surface SWNT with a combination of cation -  $\pi$  and electrostatic interactions. The merging process simplified the sonication-induced separation of NDI-Bola nanotube, followed by the expansion and integration of nanotube segments into a homogeneous array of fully integrated SWNTs.

This analysis also revealed a striped pattern across the width of the nanotubes, which indicates the rings stack together to form tubes, and rules out other packing arrangements.

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