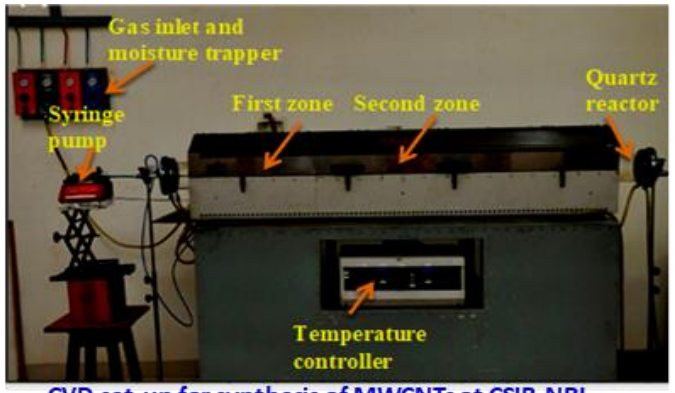
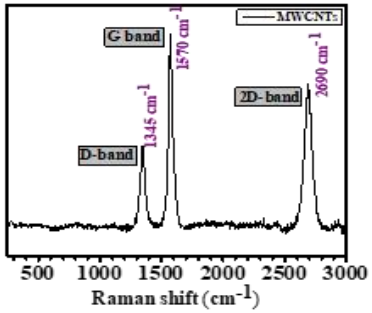
Name of the Knowhow: Indigenous MWCNTs Synthesis by CVD and Development of Flexible MWCNTs Paper Therefrom

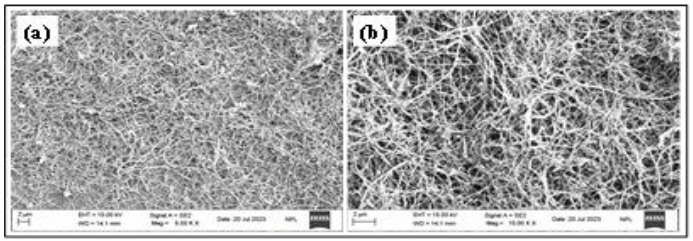
Summary: Indigenous chemical vapor deposition (CVD) process for the synthesis of multiwalled carbon nanotubes (MWCNTs) has been developed which also enable to form different sizes of flexible and freestanding papers by steps of dispersion, ultra-sonication and vacuum filtration of MWCNTs.



CVD set-up for synthesis of MWCNTs at CSIR-NPL

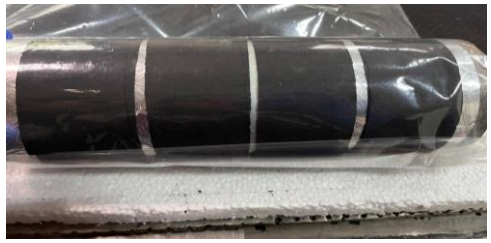


91 g of MWCNTs per batch

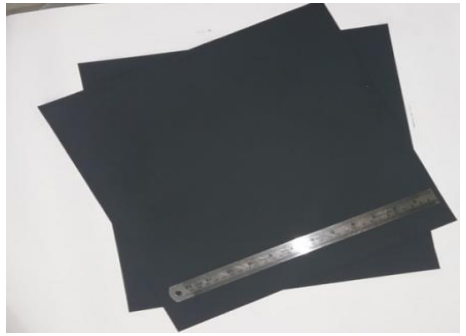


SEM of CVD-MWCNTs

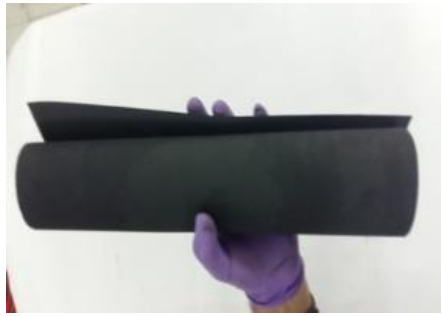
CNT Paper strips of 60 mm width and 70 cm length



Rolled CNT Paper strips



CNT Paper of size 35 cm x 35 cm



Rolled CNT Paper of size 35 cm x 35 cm

Applications: Batteries and Fuel Cells, Supercapacitors, Reinforcement, Lightning protection, EMI Shielding, Flexible thermoelectric, Armour Plating, Air and Liquid Filtration, Conductive Composites

Novelty features: In this process, the MWCNTs of sufficient length which are capable for making free-standing paper without using any binder has been synthesized by indigenously developed CVD process. Further, these CNTs are utilized for making different sizes of CNT papers by using aqueous mediated low-cost dispersion process.

Advantages: The present technology is a cost-effective approach towards the preparation of flexible freestanding paper by utilizing low-cost ingredient in the processing.

Readiness level of the Technology:

Idea	Concept Definition	Proof of Concept	Prototype	Lab Validation	Technology Development	Technology Demonstration	Technology Integrated	Market Launch

IPR related details:

Whether patent(s) has already been granted for this technology/process: No; **Whether patent(s) has already been filed for this technology/process:** No; **Whether the technology/knowhow/process is patentable:** No

Related Patents: Patent No: US Patent No. 10400074, dated 03.09.2019
Indian Patent No.- 482344, dated 14-12-23

Patent Title: Process for the preparation of carbon fiber-carbon nanotubes reinforced hybrid polymer composites for high strength structural applications

Inventor(s): Bhanu Pratap Singh, Satish Teotia, Sanjay Rangnath Dhakate
Country(s): India, USA
CSIR-IPU NF Number: 0204NF2016
Application Number(s) and Date(s): 201611036488, 25-10-2016
Publication Date: 26-04-2018
Grant Date: 03-09-2019 (US), 14-12-2023 (India)

Year of Introduction of the technology/knowhow/process: 2016

Year of Updation of the technology/knowhow/process: 2023

Broad Area/Category: Carbon Products

User Industries: Battery, Aerospace, Electronic, Automobile, Polymer Industries