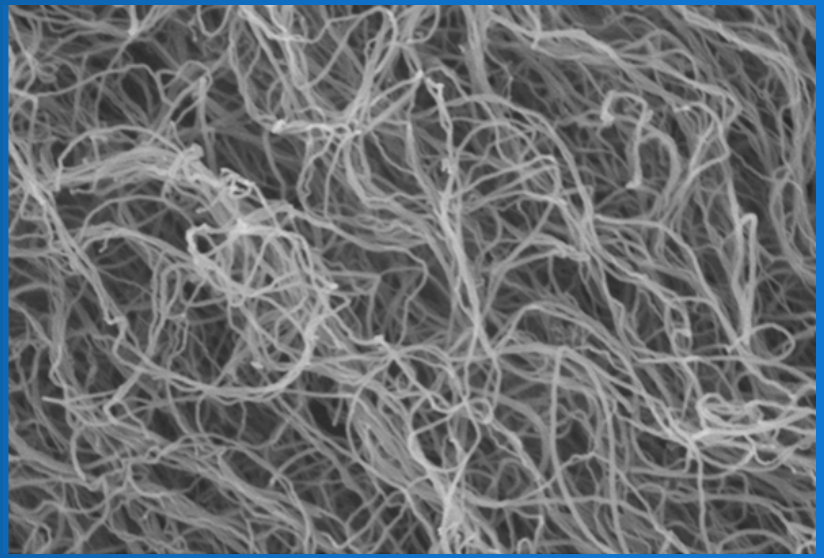
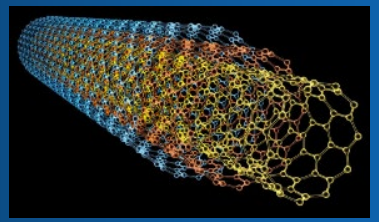
Manufacturing Carbon Nanotubes at Gigafactory Scale





Hari K Harikumar
CHASM Advanced Materials
Massachusetts , USA
www.chasmtek.com

CHASM™
ADVANCED MATERIALS

NAATBatt INTERNATIONAL

Introducing CHASM Advanced Materials, Inc.

Our mission is to develop and manufacture advanced carbon nano materials, leveraging our innovative product platforms to create a *safer, more connected and sustainable world*.

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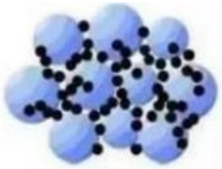
Appearing Now In Li-ion Batteries: Carbon Nanotubes!

3.4 Carbon nanotubes: 4680 battery helps improve the permeability of carbon nanotubes

3.4.1 The performance of carbon nanotubes is superior, and the permeability of carbon nanotubes is promoted by the 4680 battery

As the key auxiliary material of power battery, conductive agent can increase the conductive contact between active substances, improve the transmission rate of electrons in the electrode of lithium battery, so as to improve the rate perfor batteries requires the joi e a mixed condu ion metal phospl o improve condu discharge, the expan educed, the gap is increa so it is also neces ial in the cycle proces amount of condu current between the active substances and between the active substances and the collector fluid, so as to reduce the contact resistance of the electrode and accelerate the movement rate of electrons.

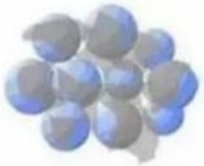
A blog post published on the Tycorun web page describes why CNTs are a preferred conductive carbon additive.



Super P

Synthetic Graphite

Carbon Nanotubes



Graphene

Pacific Northwest NATIONAL LABORATORY

NORTH AMERICAN LITHIUM BATTERY MATERIALS
V 1.2
FEBRUARY 2023

"Nanotubes allow using less material to get the same conductivity enhancement as larger amounts of carbon black. The carbon nanotubes also enable a more robust structure."

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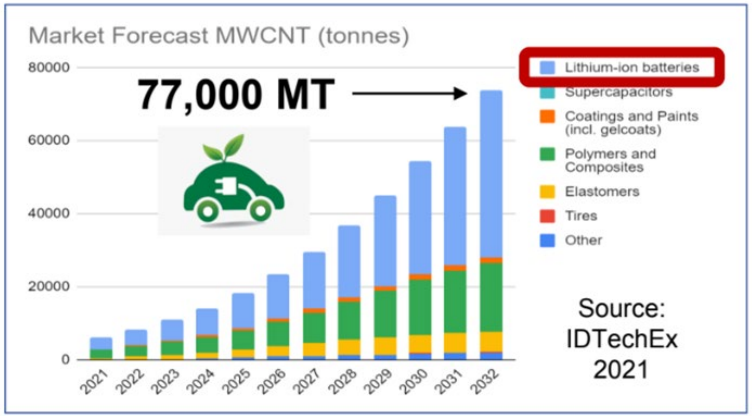
CNTs are known to boost Li-ion battery performance with:

- **Excellent electrical conductivity,**
- **Longer cycle life** due to high structural strength & toughness,
- **Better heat dissipation** during charging and discharging,
- **Improved charge rate performance** and
- **Improved energy density.**



...and mass market adoption of CNTs is on the verge of **explosive growth**.

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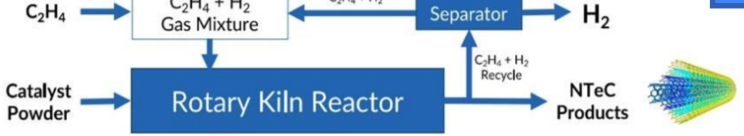
SMW300X: Made in USA with the Right Specifications

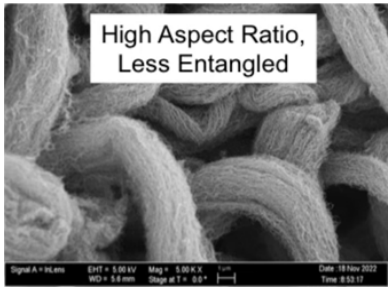
Lowest Cost, Most Scalable Production

1 Continuous Production Platform



Leveraging capital efficient and scalable Rotary Kiln Reactor compared to traditional Fluidized Bed Reactors

2 'Drop-in' MWCNT



SMW300X Beats all Specifications

- Drop-in replacement for industry standard LiB MWCNTs
- High CNT purity (> 99%)
- Metal impurity is Cobalt (no iron)
- Median Outer Diameter = 10nm
- Optimal Length after Dispersion (~2
- Low CNT defects (G/D =1 .48)
- High Specific Surface Area (303 m^2/g)

3 Easy to Disperse

Drop–in dispersion for existing processes

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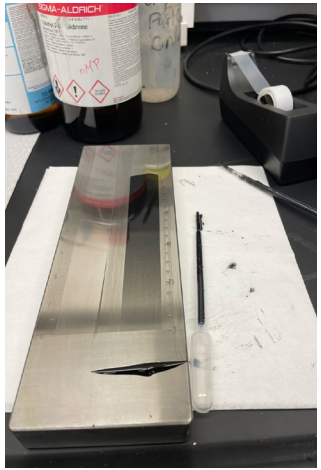
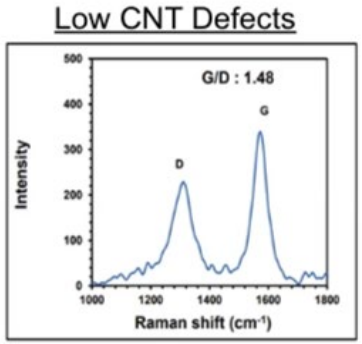
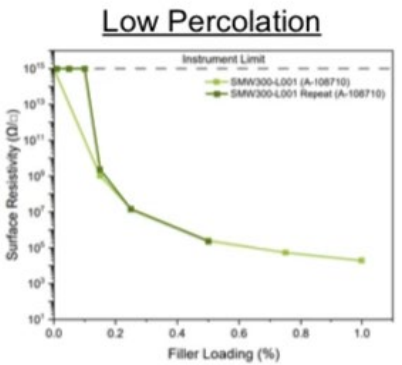
SMW300X: The Proof Is In…The Performance Data







Performance of CHASM's SMW300X has been validated by multiple 3rd parties.
Currently in talks with 3 Gigafactory Operators.

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The Scalability Journey to the World's largest CNT production platform

Generation 2
Capacity: 7 kg/day
2019

Generation 3
Capacity: 50 MTA
2022 in Norman OK

Generation 4
Capacity: 1500 MTA
H2 2024
(World's Largest CNT Unit)

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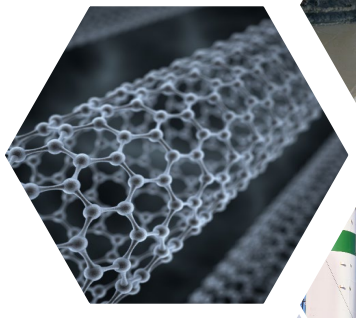

Thank You!

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