

TUBALL™

SWCNT

SINGLE WALL CARBON NANOTUBES

CONSISTENT
QUALITY

1,000+
SWCNT
TONNES/
YEAR

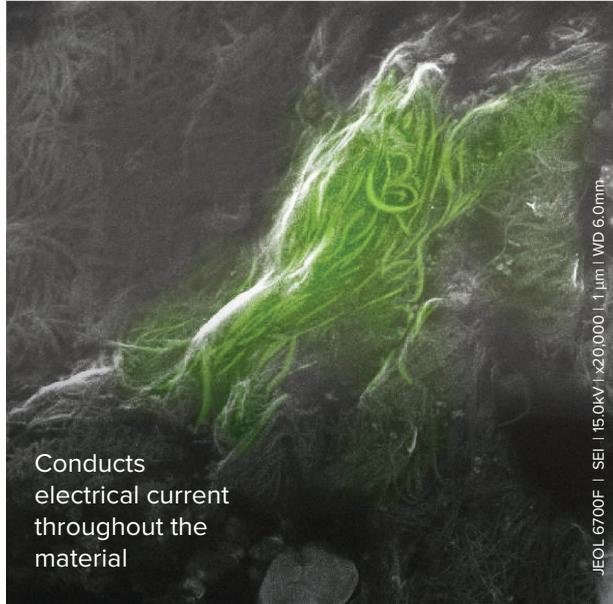
TECHNICAL
SUPPORT
IN EUROPE

DISPERSION
PRODUCTION
IN EUROPE

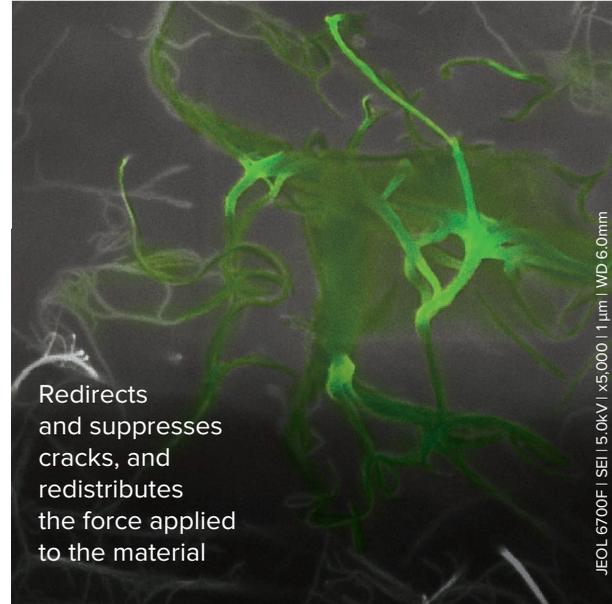
FOR ALL BATTERY
TECHNOLOGIES

3D network – multiple effects

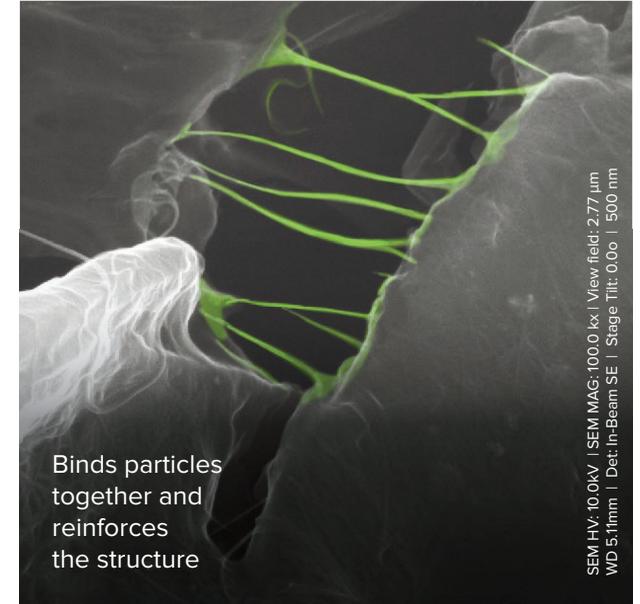
TUBALL™ single wall carbon nanotubes form a reinforcing and conductive 3D network within the material, unlocking unique properties that were previously unattainable. Below are some examples of the enhanced properties that materials can achieve with TUBALL™ nanotubes.



Rubber



Composite



Battery anode

1,000+
tonnes/year*

OCSiA
is the world's
largest
producer
of SWCNT



Today SWCNT are available
on an industrial scale under
the TUBALL™ brand name

* OCSiA's existing, in-construction and designed production sites' total capacity as of 2025.

- Consistent quality at industrial scale
- Quality inspection of every batch
- Recycled sustainable packaging
- Fast, efficient, and reliable global shipping
- ISO 9001, ISO 14001, 45001 certified, and IATF 16949 in progress

**78 successful
production site audits**

The background of the slide is a scanning electron microscope (SEM) image of carbon nanotubes. The image shows a dense network of interconnected, fibrous structures that appear as a complex, porous mesh. The color is a dark, monochromatic grey, highlighting the intricate texture and three-dimensional nature of the nanotube network.

TUBALL™ single wall carbon nanotubes – the first nanotubes available for mass-market applications

TUBALL™ nanotubes are the first single wall carbon nanotubes to become commercially available for a broad range of industrial applications. OCSiAl's breakthrough low-cost mass production technology has made the widespread use of nanotubes economically feasible, without compromising their exceptional quality.

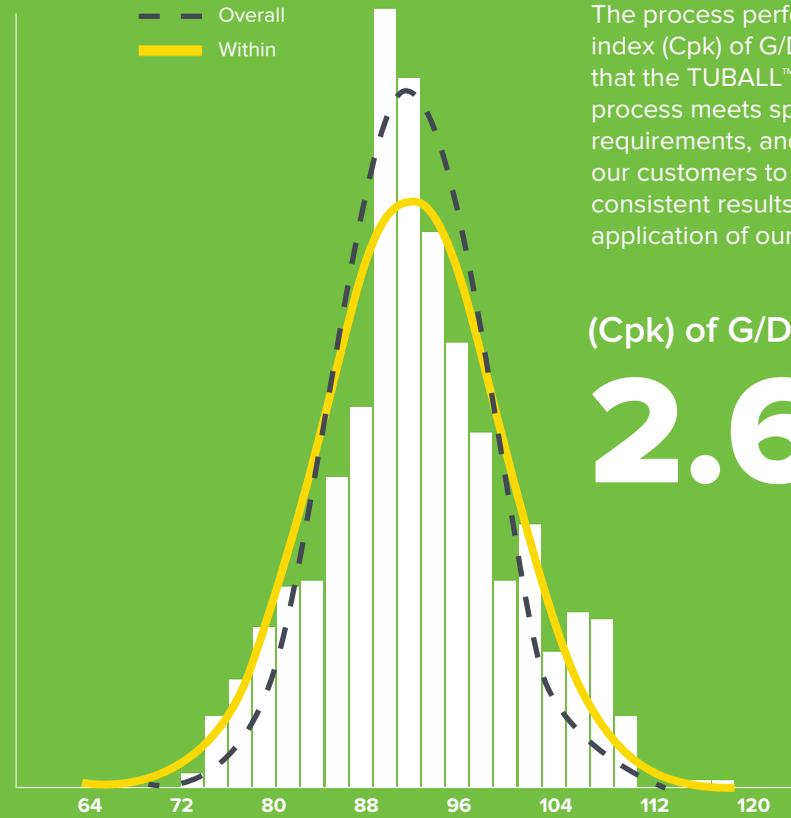
FEATURES

- High-quality nanotubes
- Gains traction starting from ultralow concentrations
- Adds uniform, permanent and stable electrical conductivity
- Enhances mechanical properties
- Maintains color, elasticity, durability and other key properties of improved materials
- Versatile for an extremely wide range of applications

Consistent high quality at industrial scale

High G/D ratio is an essential parameter demonstrating the quality of single wall carbon nanotubes

TUBALL™ SWCNT G/D ratio
up to 120
with nominal value 90



The process performance index (Cpk) of G/D indicates that the TUBALL™ production process meets specification requirements, and enables our customers to achieve consistent results in the final application of our product.

TUBALL™ SWCNT

Authorizations





TUBALL™ DISPERSIONS

For specific applications, including batteries, coatings, and elastomers, nanotubes are available in a liquid form based on various industry-common carriers, such as water, CMC, IPA, NMP, PVDF, etc.

TUBALL™ BATT

for high-energy
Si-based and
graphite anodes



FEATURES

- Compatible with the majority of state-of-the-art SiOx or Si/C and graphite anode formulations
- Enables efficient performance in water-based electrode systems
- Low content of foreign impurities
- Ready, easy to use, efficient: proven by leading Li-ion battery makers

BENEFITS



Solves the Si-anode degradation problem

TUBALL™ enables up to 100% SiO/C anodes by significantly improving the cycle life of silicon-containing anodes.



Record-high energy density achievable

Boosts energy density up to 400 Wh/kg and 1,000 Wh/l due to allowing high Si concentration.



Fast-charging ability unlocked

Enables higher charge rates due to improved 3D conductive networks between active material particles.



Mechanical reinforcement for advanced graphite anodes

Enhances the mechanical stability and energy density of graphite anodes by reducing electrode swelling during cycling and calendaring spring-back by up to 50%.

TUBALL™ BATT

for high-energy cathodes



FEATURES

- Dispersion optimized specially for cathodes
- More than 80% solids achievable
- Low Fe content
- Works efficiently from 0.02 wt.% of TUBALL™ loading
- Ready and easy to use

BENEFITS



Reduces DCR and thermal rise in high-Ni cathodes

Significantly reduces DCR growth during cycling—by up to 3× compared with conventional additives—resulting in lower heat generation and enhanced thermal stability during high-rate charge and discharge.



Delivers conductivity even with small particle size cathode materials

Forms effective long-range conductive networks in materials with particle sizes below 5 μm, where surface area is high.



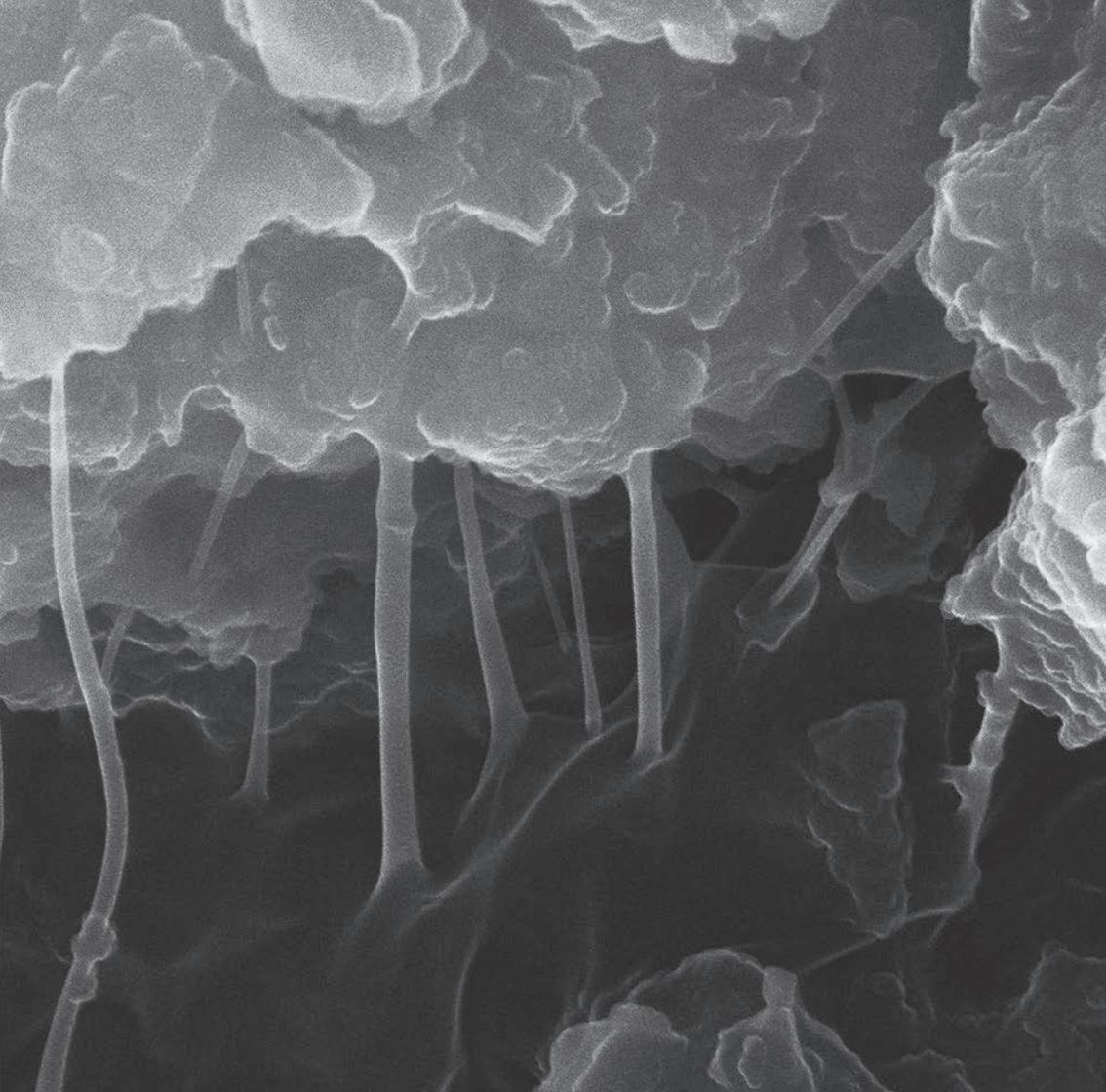
Enables higher energy density in thick-coated cathodes

Improves particle-to-particle cohesion and mechanical flexibility, enabling increased electrode thickness and active material loading. Demonstrated energy density gains of up to +10 Wh/kg in LFP and LFMP systems.



Improved adhesion

Twice as high due to stronger bonding between cathode particles, reducing cracking and delamination during calendering and cycling.



TUBALL™ LATEX

TUBALL™ LATEX is a water-based suspension for manufacturing latex gloves and latex products with anti-static properties, while retaining mechanical properties and minimally impacting the host matrix.

TUBALL™ LATEX makes it possible to attain permanent and humidity-independent conductivity that is fully compliant with the most demanding applications, including the European standard EN 16350:2014 (EN 1149) for anti-static properties in safety wear.

BENEFITS

-  Standard dipping process
-  Retain color
-  Maintain or improve mechanical properties
-  Electrical resistivity of $<10^8 \Omega$
-  Material is ready to use “as produced”



TUBALL™ COAT_E

TUBALL™ COAT_E is an easy-to-use single wall carbon nanotube suspension in water or organic solvent that provides permanent anti-static properties to various paints and coatings with minimal impact on their color and mechanical properties.

TUBALL™ COAT_E is suitable for production of anti-static polymer coatings intended for the following applications:

- UV coatings
- Packaging for electronics
- Synthetic leather
- Textiles
- ESD protective coatings
- Adhesives

BENEFITS

-  Complying with strict ESD
-  Choice of colors
-  Choice of various thicknesses
-  Permanent conductivity
-  Easy-to-use





TUBALL™ MATRIX CONCENTRATES

TUBALL™ MATRIX
in a polymer

TUBALL™ MATRIX

OCSiAl has taken the lead in the creation of technologies for introducing nanotubes into material matrixes.

In 2016 OCSiAl presented TUBALL™ MATRIX – a line of single wall carbon nanotube-based concentrates that provide materials with uniform and permanent electrical conductivity without compromising the original color or mechanical properties of the product. OCSiAl has now developed concentrates for most of the widely used industry-standard formulations.

BENEFITS



Ultralow concentration
from 0.1%



Retention of a wide
range of colors



Maintained or even
increased mechanical
strength



Permanent and uniform
conductivity without
“hot spots”



Minimum impact
on viscosity and hardness



Easy-to-use with standard
industrial equipment



15 years

IN-DEPTH R&D

12 years

ADVANCING NANOTUBE SYNTHESIS



11 years

Product development



9 years

Certified globally



7 years

In EVs, ESSs, 3C, eVTOL,
e-tools, e-bikes

OCSiAI at a glance

50
countries

24
nationalities

1,500
customers

3
R&D centers

>20
dealers

500
employees



OCSiAI global presence



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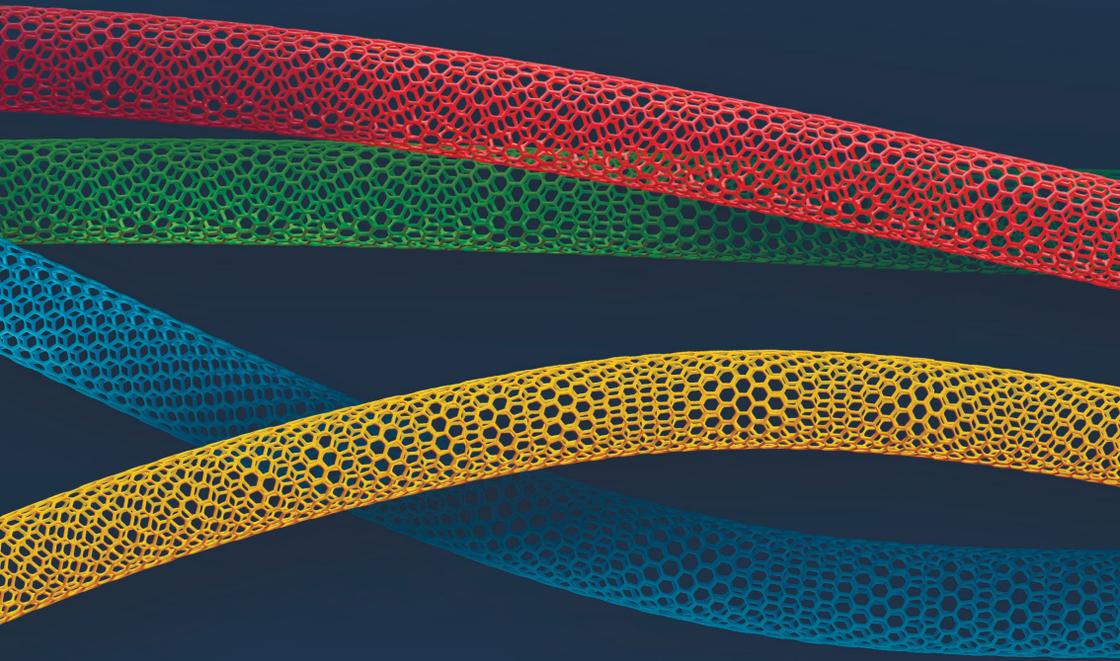
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