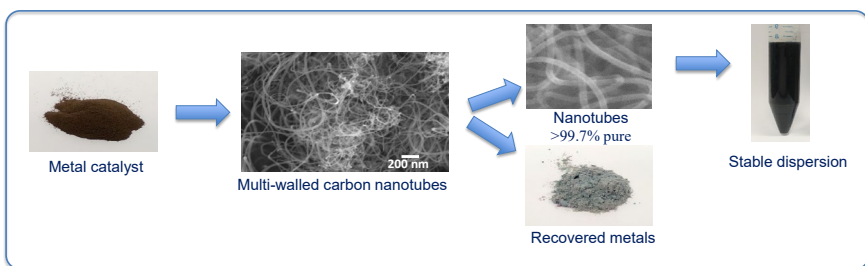


# Nanomaterials: Multi-walled carbon nanotubes from waste plastics

## Overview

Multi-walled carbon nanotubes manufactured by recycling industrial gases exhausted during plastics pyrolysis. Carbon nanotubes are synthesized over a catalyst using chemical vapor deposition process. After the synthesis, carbon nanotubes are purified and functionalized using water-free techniques, allowing for efficient metal recovery and avoidance of liquid waste. Functionalized nanotubes are available in a powdered form and as a dispersion in N-Methyl-2-pyrrolidone (NMP) for easy use in batteries, coatings and films.



## Key features

- Manufactured via chemical vapor deposition process using exhausted gas from plastic pyrolysis.
- Water-free purification and functionalization technology.
- High purity, total metal content < 0.3 wt. %.
- Modified with surface groups necessary for easy dispersion in solvents and polymers.
- Available as a powder and dispersion in NMP.

## Applications

- High performance electrostatic dissipative plastics, 3D resins and coatings.
- High efficiency energy storage devices.

Characteristics	Assay method	
Outer diameters (nm)	FESEM, TEM	5-35
BET specific surface area (m <sup>2</sup> g <sup>-1</sup> )	N <sub>2</sub> adsorption	150-210
I <sub>D</sub> /I <sub>G</sub> (-)	Raman spectroscopy	0.9-1.0
Carbon (wt.%)	Elemental analysis	98.0-99.0
Ash (wt.%)	Gravimetry (950 °C, 2h)	<0.3
Total metal content (wt.%)	ICP	<0.3
○ Cobalt (wt.%)	ICP	<0.02
○ Nickel (wt.%)	ICP	<0.02
○ Iron (wt.%)	ICP	<0.15
○ Molybdenum (wt.%)	ICP	<0.03
○ Magnesium (wt.%)	ICP	<0.02
Conductivity (S/m)	4 probe meter	>10 <sup>4</sup>
Form		Powder Dispersion (NMP) <ul style="list-style-type: none"> <li>• concentration 3.1 wt. %</li> <li>• density 1.05 g/mL</li> <li>• kinematic viscosity 4.0 cSt</li> </ul>

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