

# CARBON NANOTUBE

We tune the physical dimensions, diameter and length, of multi-walled carbon nanotube for you. Our CNTs are millimeter-scale in length and highly aligned. You can build up large-scale CNT structures with our millimeter-long aligned drawable CNTs.

## CNT, made in Hamamatsu Carbonics, is ...

**LONG**

longer than 1mm  
helping your easy handling

**STRAIGHT**

just straight as described in books

**HIGH DENSITY**

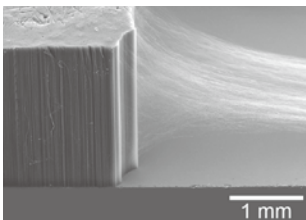
vertically aligned on a substrate  
with high areal density

CNT is a nano-sized fiber material made of carbon atoms, and has very high electrical conductivity, high thermal conductivity, and high mechanical properties. To utilize those features, HCC's provides long, easy handling, aligned CNTs.

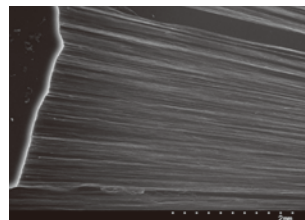
## Do you know CNT forest is drawable?

### Super drawability

1. CNTs are connected by van der Waals forces, and can form a web-like structure
2. CNTs are self-aligned in the drawing direction in the web
3. No binder material is required
4. CNT web is used as a precursor for spun yarns, sheets and more



CNT web is drawn from an edge of a CNT forest. CNTs are connected at surfaces by van der Waals force strongly. The web is very light weight and robust, and sometimes semi-transparent.



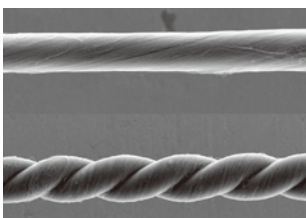
CNTs are aligned in the drawn direction. It is automatic. Length of each CNT is millimeter-scale but the web can go over than 10 m.



Doesn't need special tools to draw out the web. Just pinching out an edge of the CNT forest.



By twisting the web, it turns into a spun yarn.



Diameter of yarns in photos is 50 micron. Twisted structure is similar to conventional spun yarns. No chemical binder material is used, and so electrical and thermal conductivity, and flexibility are good.



Unidirectionally aligned CNT sheet is produced from CNT webs. High anisotropies in electrical and thermal conductivity. Free-standing robust sheet helps your work.

# OUR PRODUCTS

<p><b>Multi-walled carbon nanotube sheet</b></p> <p>CNTs are unidirectionally aligned and no binder is used.</p>  <p><b>Specifications</b></p> <p>CNT diameter : 10-40 nm            Purity : &gt;95 %            Anisotropy : Yes            Sheet resistance : <math>10\sim 10^3 \Omega/\text{sq}</math>.            Density : 1-2 g/m<sup>2</sup>            Thickness : 1-5 <math>\mu\text{m}</math> typ.</p>	<p><b>Products</b></p> <table border="1"> <thead> <tr> <th>Product #</th> <th>Width(mm)</th> <th>Length(mm)</th> </tr> </thead> <tbody> <tr><td>NTS0505</td><td>50</td><td>50</td></tr> <tr><td>NTS1010</td><td>100</td><td>100</td></tr> <tr><td>NTS1515</td><td>150</td><td>150</td></tr> <tr><td>NTS2020</td><td>200</td><td>200</td></tr> <tr><td>NTS2130</td><td>210</td><td>300</td></tr> <tr><td>NTS3030</td><td>300</td><td>300</td></tr> <tr><td>NTS3042</td><td>300</td><td>420</td></tr> </tbody> </table> <p>CNTs are aligned in the LENGTH direction of the sheet Maximum size is 300 x 420 (mm)</p>	Product #	Width(mm)	Length(mm)	NTS0505	50	50	NTS1010	100	100	NTS1515	150	150	NTS2020	200	200	NTS2130	210	300	NTS3030	300	300	NTS3042	300	420
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<p><b>Multi-walled carbon nanotube array</b></p> <p>CNTs are vertically aligned on a substrate.</p>  <p><b>Specifications</b></p> <p>CNT diameter : 10-40 nm            Purity : &gt;98 %</p>	<p><b>Products</b></p> <table border="1"> <thead> <tr> <th>Product #</th> <th>Width(mm)</th> <th>Substrate size(mm)</th> </tr> </thead> <tbody> <tr><td>NTA05</td><td>0.5±0.1</td><td></td></tr> <tr><td>NTA10</td><td>1.0±0.1</td><td></td></tr> <tr><td>NTA15</td><td>1.5±0.15</td><td>20 x 20</td></tr> <tr><td>NTA20</td><td>2.0±0.2</td><td></td></tr> <tr><td>NTA25</td><td>2.5±0.25</td><td></td></tr> <tr><td>NTA30</td><td>3.0±0.3</td><td></td></tr> </tbody> </table>	Product #	Width(mm)	Substrate size(mm)	NTA05	0.5±0.1		NTA10	1.0±0.1		NTA15	1.5±0.15	20 x 20	NTA20	2.0±0.2		NTA25	2.5±0.25		NTA30	3.0±0.3				
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<p><b>Drawable multi-walled carbon nanotube array</b></p> <p>CNTs are vertically aligned on a substrate.            A CNT web can be drawn from the CNT array.</p>  <p><b>Specifications</b></p> <p>CNT diameter : 10-40 nm            Purity : &gt;98 %</p>	<p><b>Products</b></p> <table border="1"> <thead> <tr> <th>Product #</th> <th>Width(mm)</th> <th>Substrate size(mm)</th> </tr> </thead> <tbody> <tr><td>NTAD10</td><td>1.0±0.5</td><td>10 x 20</td></tr> </tbody> </table>	Product #	Width(mm)	Substrate size(mm)	NTAD10	1.0±0.5	10 x 20																		
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<p><b>Multi-walled carbon nanotube flake</b></p> <p>Flake of Bundled CNTs. CNTs are just connected by van der Waals force.            No binder material is used. It is not like powder form.</p>  <p><b>Specifications</b></p> <p>CNT diameter : 10-40 nm            CNT length : 1±0.5 mm            Purity : &gt;95 %</p>	<p><b>Products</b></p> <table border="1"> <thead> <tr> <th>Product #</th> <th>Weight (g)</th> </tr> </thead> <tbody> <tr><td>NTF01</td><td>1</td></tr> <tr><td>NTF05</td><td>5</td></tr> </tbody> </table>	Product #	Weight (g)	NTF01	1	NTF05	5																		
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<p><b>Multi-walled carbon nanotube yarn</b></p> <p>A CNT web is spun into a twisted yarn. CNTs are connected by van der Waals forces. No binder material is used.</p>  <p><b>Specifications</b></p> <p>CNT diameter : 10-40 nm            Purity : &gt;98 %            No binder material is used.</p>	<p><b>Products</b></p> <table border="1"> <thead> <tr> <th>Product #</th> <th>Yarn length(m)</th> <th>Yarn diameter(<math>\mu\text{m}</math>)</th> <th>Resistivity(<math>\Omega\text{cm}</math>)</th> </tr> </thead> <tbody> <tr><td>NTY10</td><td>10</td><td>50 typ.</td><td>0.002-0.005</td></tr> </tbody> </table>	Product #	Yarn length(m)	Yarn diameter( $\mu\text{m}$ )	Resistivity( $\Omega\text{cm}$ )	NTY10	10	50 typ.	0.002-0.005																
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We are happy to prepare special products for you. We meet your request with our CNTs. Please contact us.

## Explorer the potential use of drawable, aligned, ultra-long carbon nanotube

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