DATA SHEET

DEXMAT.COM

GALVORN®

CARBON NANOMATERIAL

JANUARY 2025

THE LIGHTEST, STRONGEST, AND MOST FLEXIBLE CONDUCTIVE MATERIAL ON THE PLANET

LET'S BUILD A WORLD WHERE WE DO MORE WITH LESS.

Introduction to Galvorn Carbon Nanomaterials

What is Galvorn?

Galvorn is an advanced solid carbon. It has a unique combination of conductivity, strength, low density, thermal stability, and flexibility. DexMat produces Galvorn using its patented wet spinning process, which densely packs and aligns carbon nanotube feedstock into flexible fibers and films.

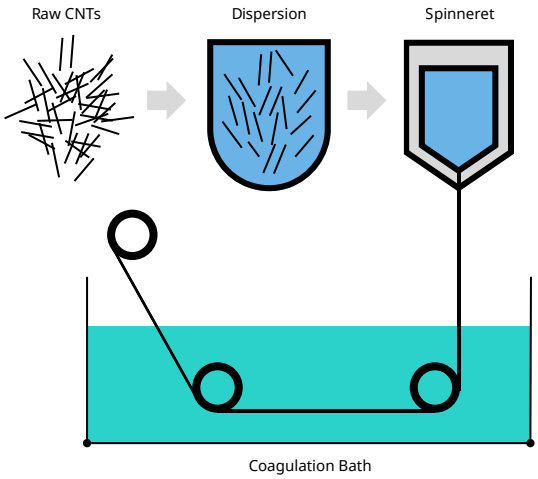
This platform technology was originally invented by Nobel laureates for high-performance space applications. Today, we make different types of Galvorn to meet a broad range of applications on earth.

BUY SAMPLES ONLINE

Development and Molecular Structure of Galvorn®

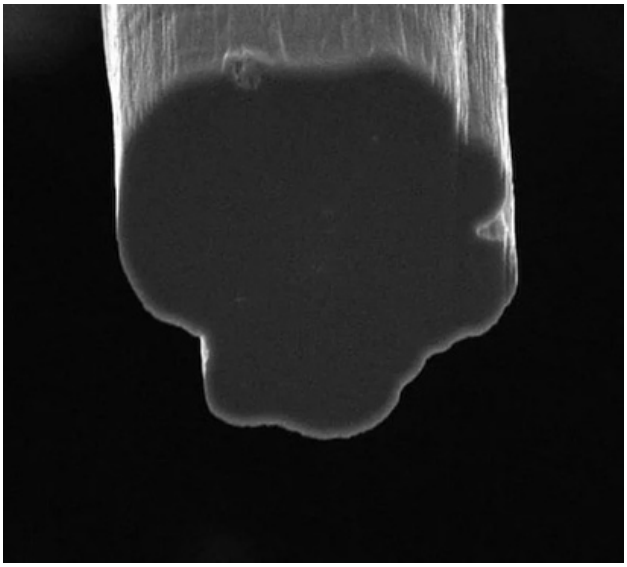
In 2001 at Rice University, Nobel laureate Richard Smalley, PhD, began trying to use liquid processing technology to spin carbon nanotubes into fibers that retained the tubes' electrical and mechanical properties over kilometer lengths. Wet spinning fibers is a well-established technology, producing viscose fibers at 100 kt plant scale. If you don't know what viscose fibers are, you've almost surely worn them: tencel, lyocell, micro-modal, modal, rayon, and bamboo rayon are all viscose.

Figure 1. Wet Spinning CNT Fiber



DexMat Co-Founder and Chief Science Advisor, Matteo Pasquali, PhD, was part of the project from the beginning and took over after Smalley's passing in 2005. By 2013, the team achieved the first demonstration of high conductivity and strength in carbon nanotube fibers. Professor Pasquali led the team, which then included Dmitri Tsentalovich, PhD, now DexMat Co-Founder and CTO, as well as Colin Young, PhD, now DexMat Senior Research Scientist.

Figure 2. Galvorn fiber close-up. Alignment and packing unlocks superior properties.



Galvorn bridges the gap between the extraordinary nanoscale properties of individual CNTs and practical, macroscale applications. Spinning them into fibers allows us to harness these attributes in a form that's usable in real-world products, amplifying their impact across industries.

Spinning fibers also enable the "macroscale" structures to be made of pure carbon, maintaining a key advantage with CNTs: recycling. The advanced materials community has long been challenged by the issue of carbon fiber recycling. Current carbon fibers can only be downcycled at their end of life by breaking them into smaller pieces, rendering them unsuitable for reuse in high-performance, lightweight composites. However, CNTs (the emerging second-generation carbon fibers), offer a more sustainable solution. The study found that carbon fibers made out of carbon nanotubes can be fully recycled from mixed streams (i.e., in realistic conditions for end-of-life recycling).

State of the Art Materials Comparisons*

		CONDUCTIVE		STRUCTURAL		TEXTILE	
Properties	**Galvorn**	Copper	Aluminum	Steel	Carbon Fiber	Aramids (Kevlar)	Dyneema
Specific Conductivity (Sm2/kg)	6150	6300	12200	400	50	-	-
Conductivity, MS/m	10	58	33	3.4	0.1	Insulating	Insulating
Strength, GPa	3	0.38	0.41	1	6.4	3	3.9
Density, g/cm3	1.6	9	2.7	8	2.1	1.4	0.98
Thermal Conductivity, W/m-K	450	385	237	50	200 - 1000	0.04	20
Young's Modulus, GPa	200	100	68	200	200 - 400	130	132
Tenacity (N/tex)	2	0.04	0.15	0.13	3	2.1	3.9
Flex Life (Cycles)	1,000,000	100,000	10,000	10,000	10,000	1,000,000	-

*Properties here based on tests performed on single filament fiber or solid metal wire. Steel and carbon fiber properties are for their high-end forms.

GALVORN IS ALSO...

CORROSION RESISTANT
No rusting, no pitting even over years.

FLAME-RESISTANT
It does not melt, it's VERY hard to burn.

CUT-RESISTANT
Backed by science (and lumberjacks)

SUSTAINABLE & RECYLABLE
Sustainable to produce and can be recycled without losing properties.

Galvorn® Grades

Galvorn is currently available in two grades. While both grades maintain superior light-weighting and flexibility, each has been optimized to suit different application needs.

Galvorn® 1000

Galvorn® 1000 is optimized for high strength applications, while also featuring the best in conductivity and other properties. Galvorn® 1000 can also be annealed to remove any trace impurities. This will not significantly affect the strength of the material, but may increase the electrical resistance by as much as a factor of four.

Galvorn® 800

Galvorn® 800 is optimized for compatibility with standard textile manufacturing equipment. With about ⅓ the strength and ¾ the conductivity of Galvorn® 1000 its properties remain superior to traditional textile conductive fibers, while its reduced tensile strength gives it the benefit of being more compatible with standard textile manufacturing equipment.

Galvorn® Fiber Tow

Carbon nanotube fiber (CNTF) tows of single filament fibers. Customers use our high-performing CNT fibers for electrodes, sensors, composites, and more.

Fiber Tow	**Galvorn® 1000**	**Galvorn® 1000**	**Galvorn® 800**
	10 filaments	**20 filaments**	**20 filaments**
Linear Mass (mg/m)	5.5 ± 1.0	11 ± 2.0	30 ± 0.3
Density (g/cm3)*	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2
Resistance (Ω/m)	36 ± 4.0	18 ± 3.0	9 ± 3
Specific Conductivity (Sm2/kg)	5000 ± 300	5000 ± 300	3700 ± 300
Break Force (kg)	0.85 ± 0.1	1.5 ± 0.2	1.6 ± 0.3
Tensile Strength (GPa)*	1.4 ± 0.2	1.4 ± 0.1	0.7 ± 0.1
Tenacity (N/tex)	1.5 ± 0.2	1.5 ± 0.1	0.53 ± 0.3
Elongation(%)	3.0 ± 0.5	3.0 ± 0.5	3.0 ± 0.5
Tensile Modulus (GPa)	70 ± 5	60 ± 5	25 ± 5
Available lengths, m	1 - 5,000		
Available # of filaments per tow	5 - 200		

All listed Galvorn fiber and yarn properties were measured at 21 ± 2°C and 50 ± 10% relative humidity.

Galvorn® Twisted Yarn

We construct our carbon nanotube (CNT) twisted yarns by twisting multifilament Galvorn fibers to secure the filaments together.

Twisted Yarn	**Galvorn® 1000**	**Galvorn® 1000**	**Galvorn® 1000**	**Galvorn® 800**
	150 µm	**200 µm**	**500 µm**	**400 µm**
Diameter	140 ± 15	200 ± 20	480 ± 40	370 ± 20
Linear Mass (mg/m)	17 ± 2	33 ± 6	170 ± 10	90 ± 10
Density (g/cm3)	1.1 ± 0.2	1.0 ± 0.2	0.9 ± 0.1	0.9 ± 0.2
Resistance (Ω/m)	12 ± 2	6.6 ± 2.0	1.2 ± 0.2	2.9 ± 0.3
Conductivity (MS/m)	5.4 ± 1.5	5.5 ± 1.0	4.4 ± 0.5	3.3 ± 0.5
Break Force (kg)	2.7 ± 0.4	4.5 ± 1.0	20 ± 2.0	5.9 ± 2.0
Strength (GPa)	1.7 ± 0.5	1.4 ± 0.2	1.0 ± 0.15	0.54 ± 0.15
Tenacity (N/tex)	1.5 ± 0.3	1.4 ± 0.2	1.1 ± 0.1	0.62 ± 0.15
Elongation(%)	3.0 ± 0.5	3.5 ± 0.5	4.5 ± 0.5	4.5 ± 0.5
Tensile Modulus (GPa)	65 ± 5	45 ± 5	40 ± 5	20 ± 5
Available lengths, m	1 - 2,000			

All listed Galvorn fiber and yarn properties were measured at 21 ± 2°C and 50 ± 10% relative humidity.

Galvorn® Braided Yarn

We can construct our high strength, high performance carbon nanotube (CNT) braided yarns to suit different application needs. Our standard 1000 µm braided yarn is readily available in a variety of lengths. You may place a special order if you require larger diameters.

Braided Yarn	Galvorn® 1000
	1000 µm
Diameter	1000 ± 40
Linear Mass (mg/m)	900 ± 30
Density (g/cm3)	1.0 ± 0.1
Resistance (Ω/m)	0.35 ± 0.1
Conductivity (MS/m)	3.5 ± 0.5
Break Force (kg)	90 ± 5
Strength (GPa)	1.1 ± 0.2
Tenacity (N/tex)	0.9 ± 0.2
Elongation(%)	15 ± 2
Tensile Modulus (GPa)	17 ± 2
Available lengths, m	1 - 2,000

All listed Galvorn fiber and yarn properties were measured at 21 ± 2°C and 50 ± 10% relative humidity.

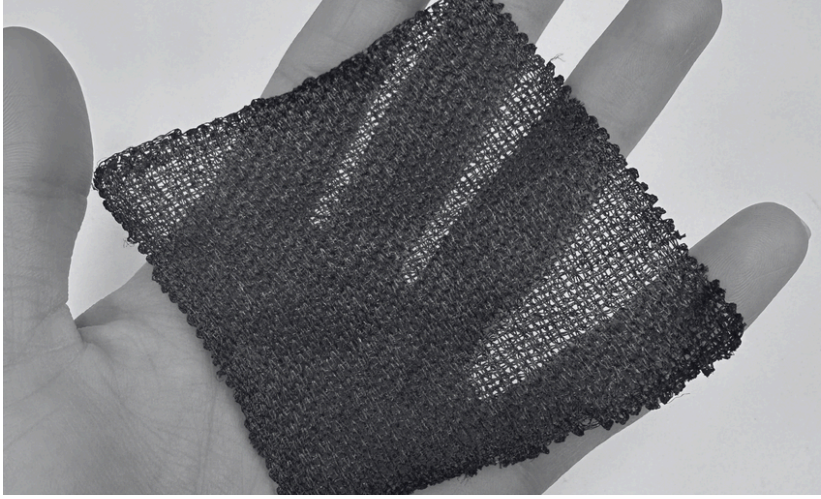
Galvorn® F10 Film

Galvorn® F10 Film offers Galvorn's powerful combination of strength, conductivity, and light weight in a thin, ribbon-like form. Engineered for applications where mass is a critical constraint, this film provides a continuous conductive surface.

Film	**Galvorn® F10**	**Galvorn® F10**
	1 cm wide	**2 cm wide**
Width (cm)	1.0 ± 0.1	2.0 ± 0.3
Thickness (µm)	20 ± 5	10 ± 5
Linear Mass (g/m)	0.27 ± 0.04	0.4 ± 0.1
Resistance (Ω/m)	1 ± 0.2	0.90 ± 0.15
Conductivity (MS/m)	5 ± 1	6 ± 1
Strength (GPa)	0.6 ± 0.1	0.6 ± 0.1
Tenacity (N/tex)	0.5 ± 0.1	0.5 ± 0.1
Available lengths, m	1 - 100	

All listed Galvorn fiber and yarn properties were measured at 21 ± 2°C and 50 ± 10% relative humidity.

Galvorn Fabric



Galvorn carbon nanotube (CNT) fabric is highly conductive and made from interlocking loops of Galvorn CNT yarn. We have 3×3 inch samples readily available for purchase.

Please note, however, **Galvorn fabrics can be customized**. You can modify the thickness of the yarn and/or the density and spacing to adjust the suppleness of the fabric. And because the yarns behave like a textile, you can sew, weave, knit, and even blend them with other textiles to achieve your application goals. Please contact us to discuss your needs.

Fabric	**Galvorn® 1000**	**Galvorn® 800**
	3x3 inch	**3x3 inch**
Fabric Thickness (mm)	0.45 ± 0.1	0.45 ± 0.1
Sheet Resistance (Ω/sq)	0.03 ± 0.01	0.06 ± 0.01
Aerial Density (gsm)	138 ± 5	140 ± 10
Dimensions (inches)	3 x 3	3 x 3

All listed Galvorn fiber and yarn properties were measured at 21 ± 2°C and 50 ± 10% relative humidity.

Contact Us

Write to **hello@dexmat.com**

Visit **dexmat.com**

Samples available for purchase at **dexmat.com/store**

Headquartered in **Houston, Texas, USA**