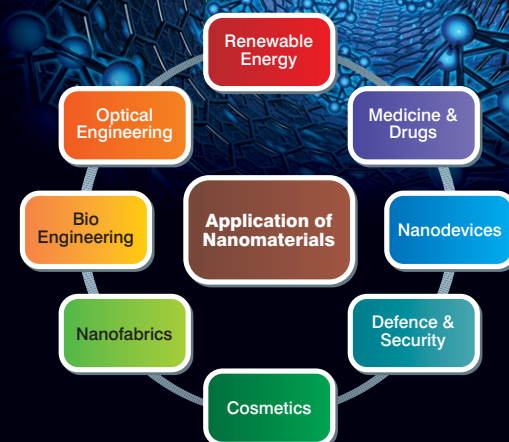


Nanomaterials

Nanotubes, Nanodispersions, Mesoporous Nanopowders and Specialised Graphene Nanoproducts

Nanomaterials are the new step in the evolution of understanding and utilization of materials in the field of Nanoscience and Nanotechnology, which are broad and interdisciplinary area of research & development that has been growing explosively worldwide in the past few years.

We at **SRL** recognise this growth and thereby offer wide range of Nanomaterials having potential for revolutionizing the ways in which materials and products are created and nature of functionalities that can be accessed.



Nanotubes

Carbon Nanotubes (CNTs) are allotropes of carbon with a cylindrical structure. These cylindrical carbon molecules have novel properties that make them potentially useful in many applications of nanotechnology with their unique surface area, stiffness, strength and resilience. **SRL** offers variants in Carbon Nanotubes and Application Specific Carbon Nanotubes i.e. Functionalized Nanotubes having wide range of applications such as in Optics, Electronics, Therapeutics and many more.

Our Range also includes Boron Nitride Nanotubes (BNNT) having a structure similar to that of carbon nanotubes, however the properties are very different i.e. BNNT's are more thermally and chemically stable than CNT's which favors them for some applications. Whereas our Dispersants for Nanotubes provide solutions for customers who prefer CNT's its in dispersed forms in water or non-aqueous systems.

Single Walled Carbon Nanotubes (SWCNT) Preparation Method: Chemical Vapour Deposition (CVD)

CAS:308068-56-6

Product Code	Product Name	Product Description <i>OD=Outer Diameter, L=Length</i>	Pkg
73953	SWCNT Type 1	Assay – min.90%, OD: 1-2nm, L: 5-30 μ m	250mg & 1gm
20770	SWCNT Type 2 (Short)	Assay – min.90%, OD: 1-2nm, L: 0.5-2 μ m	100mg & 250mg
29129	SWCNT Type 3 (Short, -COOH Functionalized)	Assay – min.90%, OD: 1-2nm, L: 0.5-2 μ m, -COOH Content: 2.73wt%, Carboxyl(-COOH) Functionalized	100mg & 250mg
18989	SWCNT Type 4 (-COOH Functionalized)	Assay – min.90%, OD: 1-2nm, L: 5-30 μ m -COOH Content: ~2.75wt%, Carboxyl(-COOH) Functionalized	50mg & 250mg
55024	SWCNT Type 5 (-OH Functionalized)	Assay – min.90%, OD: 1-2nm, L: 5-30 μ m -OH Content: ~4wt%, Hydroxyl (-OH) Functionalized	50mg & 250mg
27404	SWCNT Type 6 (-NH2 Functionalized)	Assay – min.99%, OD: 1-2nm, L: 5-30 μ m Amide (-NH2) Functionalized	50mg & 250mg
95425	SWCNT Type 7 in aq. Media (Semiconducting) pure	Assay – min.90%, OD: 1-2nm, L: 0.5-4 μ m Concentration: 1mg/100ml	20ml
52710	SWCNT Type 8 in aq. Media (Semiconducting) extrapure	Assay – min.95%, OD: 1-2nm, L: 0.5-4 μ m Concentration: 1mg/100ml	20ml
42480	SWCNT Type 9 (Metallic/Conducting) pure	Assay – min.70%, OD: 1-2nm, L: 0.5-4 μ m Concentration: 1mg/100ml	20ml
68069	SWCNT Type 10 in aq. media (Metallic/Conducting) extrapure	Assay – min.95%, OD: 1-2nm, L: 0.5-4 μ m Concentration: 1mg/100ml	20ml
81868	SWCNT Type 11 (Semiconducting) ultrapure	Assay – min.90%, OD: 0.7-0.9nm, L: ~1 μ m Typical Properties: High aspect ratio (1,000) Carbon content (>90 wt%), >50% of tubes are (6,5) chirality, >90% of tubes are semiconducting	50mg
28989	SWCNT Type 12 (Metallic/Conducting) ultrapure	Assay – min.90%, OD: ~1.2nm, L: ~1.5 μ m Bulk Density: 0.091g/cm ³ Typical properties: High aspect ratio (1,000) Carbon content (>90 wt%), High metallic tube content, High electrical conductivity	50mg

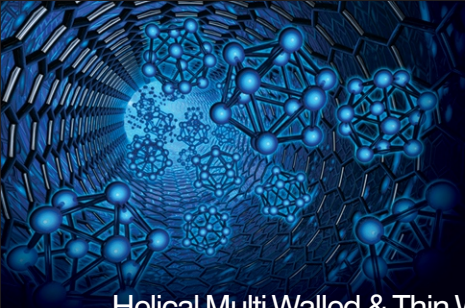
*Bulk pack sizes available on request

Double Walled Carbon Nanotubes (DWCNT) Preparation Method: Chemical Vapour Deposition (CVD)

CAS:308068-56-6

Product Code	Product Name	Product Description <i>OD=Outer Diameter, L=Length</i>	Pkg
36078	DWCNT Type 1	Assay – min.60%, OD: 2-4 nm, L: 50 μ m, SSA: >350m ² /g	100mg & 500mg
85143	DWCNT Type 2 (Short)	Assay – min.60%, OD: 2-4 nm, L: 0.5-2 μ m, SSA: >350m ² /g	100mg & 500mg
45565	DWCNT Type 3 (-COOH Functionalized)	Assay – min.60%, OD: 2-4 nm, L: 50 μ m, -COOH content: 2.73wt%, SSA: >350m ² /g Carboxyl (-COOH) Functionalized	50mg & 250mg
69072	DWCNT Type 4 (-OH Functionalized)	Assay – min.60%, OD: 2-4nm, L: 50 μ m, -OH content: 3.96wt% SSA: >350m ² /g Hydroxyl (-OH) Functionalized	50mg & 250mg

*Bulk pack sizes available on request



Helical Multi Walled & Thin Walled Carbon Nanotubes (HMWCNT & TWCNT)

Preparation Method: Chemical Vapour Deposition (CVD)

CAS: 308068-56-6

Product Code	Product Name	Product Description <i>OD=Outer Diameter, L=Length</i>	Pkg
34528	HMWCNT Type 1 Helical	Total CNT content – 90% pure , Helical CNTs: 60~65%, OD: 200 nm, L: <10 μ m, SSA: > 30m ² /g	250 mg & 1 gm
59800	TCNT Type 1	Assay – min.90% 2-5nm OD, 1-2nm ID, L- 5-30 μ m, SSA: 320m ² /g	25mg & 100mg

*Bulk pack sizes available on request

Multi Walled Carbon Nanotubes (MWCNT) Preparation Method: Chemical Vapour Deposition (CVD)

CAS:308068-56-6

Product Code	Product Name	Product Description <i>OD=Outer Diameter, L=Length</i>	Pkg
57743	MWCNT Type 1	Assay – min.95%, OD: <8nm, L: 10-30 μ m	1gm & 5gm
88440	MWCNT Type 2	Assay – min.95%, OD: 8-15nm, L: 10-30 μ m	1gm & 5gm
68465	MWCNT Type 3	Assay – min.95%, OD: 10-20nm, L: 10-30 μ m	1gm & 5gm
41067	MWCNT Type 4	Assay – min.95%, OD: 20-30nm, L: 10-30 μ m	1gm & 5gm
41335	MWCNT Type 5	Assay – min.95%, OD: 30-50nm, L: 10-30 μ m	1gm, 5gm & 25gm
96390	MWCNT Type 6	Assay – min.95%, OD: >50nm, L: 10-30 μ m	1gm, 5gm & 25gm
35203	MWCNT Type 7 (Graphitized)	Assay – min.99.9% OD: 30-50nm, L: 20 μ m, SSA: >30m ² /g	1gm & 5gm
73235	MWCNT Type 8 (Graphitized, -COOH Functionalized)	Assay – min.99.9%, OD: 10-20nm, L: 20 μ m, -COOH content: 1.0wt%, SSA: >100m ² /g, Carboxyl (-COOH) Functionalized	500mg & 1gm
46918	MWCNT Type 9 (Graphitized -OH Functionalized)	Assay – min.99.9%, OD: 10-20nm, L: 20 μ m, -OH content: 1.53wt%, SSA: >100m ² /g, Hydroxyl (-OH) Functionalized	500mg & 1gm
58255	MWCNT Type 10 (-COOH Functionalized)	Assay – min.95%, OD: 10-20nm, L: 10-30 μ m, -COOH content: ~2wt%, Carboxyl (-COOH) Functionalized	500mg & 1gm
29466	MWCNT Type 11 (-NH ₂ Functionalized)	Assay – min. 95%, OD: 10-20nm, L: 10-30 μ m Amide (-NH ₂) Functionalized	50mg & 100mg
82903	MWCNT Type 12 (-OH Functionalized)	Assay – min.95%, OD: 10-20 nm, L: 10-30 μ m, -OH content: ~3.1wt%, Hydroxyl (-OH) Functionalized	500mg & 1gm
28658	MWCNT Type 13 (-COOH Functionalized)	Assay – min.95%, OD: 30-50 nm, L: 10-30 μ m, -COOH content: ~0.7wt%, Carboxyl (-COOH) Functionalized	500mg & 1gm
65875	MWCNT Type 14 (-NH ₂ Functionalized)	Assay – min.95%, OD: 30-50nm, L: 10-30 μ m, Amide (-NH ₂) Functionalized	50mg & 100mg
24968	MWCNT Type 15 (-OH Functionalized)	Assay – min.95%, OD: 30-50 nm, L: 10-30 μ m -OH content: ~1.1wt%, Hydroxyl (-OH) Functionalized	500mg & 1gm
33670	MWCNT Type 16 Short	Assay – min.95%, OD: <8nm, L: 0.5-2 μ m	500mg & 1gm
28174	MWCNT Type 17 Short	Assay – min.95%, OD: 10-20 nm, L: 0.5-2 μ m	500mg & 1gm
90797	MWCNT Type 18 Short	Assay – min.95%, OD: 30-50nm, L: 0.5-2 μ m	500mg & 1gm

*Bulk pack sizes available on request

Boron Nitride Nanotubes (BNN)

CAS: 10043-11-5

Product Code	Product Name	Product Description <i>OD=Outer Diameter, L=Length</i>	Pkg
76005	Boron Nitride Nanotubes (B) Bamboo structure	M.W. 24.82, Purity: ~ 85-90%, OD: 40-80nm, L: 10-30 μ m	500mg
45882	Boron Nitride Nanotubes (C) Cylindrical structure	M.W. 24.82 Purity: 60-75%, OD: <15nm, L: 10-30 μ m	500mg

*Bulk pack sizes available on request

Carbon Nanotubes Dispersant

Carbon Nanotube Dispersants are used to make stable suspensions of CNT's, for both aqueous and non-aqueous methods.

Product Code	Product Name	Product Description	Pkg
28186	CNT Dispersant AC	Non-aqueous Dispersant	20ml
35210	CNT Dispersant AQ	Aqueous Dispersant	20ml

*Bulk pack sizes available on request # Product details available on request

Nanodispersions

Nanodispersions are suspensions of nanoparticles in water or organic solvents having applications in Pharmaceutical, Food and Personal Care/Cosmetics research.

Product Code	Product Name	CAS No.	Product Description	Pkg
41892	Aluminium Oxide (Boehmite) Nanodispersion (50nm)	1318-23-6	M.W. 59.99 , APS: 50nm, Particle charge: (+), pH 4, Specific gravity: 1.19, Viscosity: 10cps, counter ion (mol/mol): 0.049 No ₃ , 20wt% in H ₂ O, colloidal dispersion	25gm & 100gm
60703	Graphene Carboxyl (GCOOHW) Water Nanodispersion (5mg/ml)	7782-42-5	M.W. 12.01 Assay – min.99%, APS: 1-5µm, Thickness 0.8-1.2nm, Carboxyl ratio 5.0%	20ml
Monodisperse Gold Nanoparticles Truly uniform and monodisperse spherical Gold Nanoparticles in aqueous media. The particles have a very narrow size distribution (CV between 5% and 15%). The solutions are stabilized with HAuCl ₄				
73225	Monodisperse Gold Nanoparticles (AU05)	7440-57-5	A.W. 196.97, APS: 5nm Concentration: 5.0×10^{13} particles/ml.	5ml, 10ml & 25ml
36848	Monodisperse Gold Nanoparticles (AU10)	7440-57-5	A.W. 196.97, APS: 10nm, Concentration: 5.7×10^{12} particles/ml.	5ml, 10ml & 25ml
72123	Monodisperse Gold Nanoparticles (AU20)	7440-57-5	A.W. 196.97, APS: 20nm, Concentration: 7.0×10^{11} particles/ml.	5ml, 10ml & 25ml
60974	Monodisperse Gold Nanoparticles (AU40)	7440-57-5	A.W. 196.97, APS: 40nm, Concentration: 9×10^{10} particles/ml.	5ml, 10ml & 25ml
91082	Monodisperse Gold Nanoparticles (AU60)	7440-57-5	A.W. 196.97, APS: 60nm, Concentration: 2.6×10^{10} particles/ml.	5ml, 10ml & 25ml
Monodisperse Silver Nanoparticles Truly Monodisperse Silver Nanoparticles in aqueous media, 0.02 mg/ml, supplied in 2mM citrate				
46912	Monodisperse Silver Nanoparticles (AG20)	7440-22-4	A.W. 107.87, APS: 20nm, Concentration: 7.0×10^{11} particles/ml.	5ml, 10ml & 25ml
49241	Monodisperse Silver Nanoparticles (AG40)	7440-22-4	A.W. 107.87, APS: 40nm, Concentration: 9×10^{10} particles/ml.	5ml, 10ml & 25ml
58322	Monodisperse Silver Nanoparticles (AG60)	7440-22-4	A.W. 107.87, APS: 60nm, Concentration: 2.6×10^{10} particles/ml.	5ml, 10ml & 25ml
22806	Silicon Dioxide (Silica) Nanodispersion Type A (20nm)	7631-86-9	M.W. 60.08, APS: 20nm , Particle charge (-), pH 9, Viscosity: 25 cps, 40wt% in H ₂ O, colloidal dispersion	25gm & 100gm
69337	Silicon Dioxide (Silica) Nanodispersion Type B (20nm)	7631-86-9	M.W. 60.08, APS: 20 nm, Particle charge (-), Sodium stabilizing counter ion, pH 10.0, Viscosity: 13 cps 40wt% in H ₂ O, colloidal dispersion	25gm & 100gm
58531	Single Layer Graphene Oxide (SLGOE) Ethanol Nanodispersion (5mg/ml) <i>Preparation method: Modified hummer's method</i>	7782-42-5	M.W. 12.01, Flake size: 0.5-2.0µm, Single-layer ratio: >80%, Thickness: 0.6-1.2nm, Appearance: Brown/Black	10ml
72536	Single Layer Graphene Oxide (SLGOW) Water Nanodispersion (5mg/ml) <i>Preparation method: Modified hummer's method</i>	7782-42-5	M.W. 12.01, Flake size: ~500nm, Single-layer ratio: >80%, Thickness: 0.6-1.2nm, Appearance: Brown/Black	10ml & 25ml
94632	Titanium Dioxide Anatase Nanodispersion (15nm)	13463-67-7	M.W. 79.87, APS: 15nm, 15wt% in H ₂ O, colloidal dispersion	25gm & 100gm
64394	Titanium Dioxide Rutile Nanodispersion (30nm)	13463-67-7	M.W. 79.87, APS: 30nm, 40wt% in H ₂ O, colloidal dispersion	25gm & 100gm
64168	Zinc Oxide Nanodispersion Type A-Nonionic (70nm)	1314-13-2	M.W. 81.38, APS: 70nm, 50wt% in H ₂ O, colloidal dispersion with non-ionic dispersant	10gm & 25gm
80467	Zinc Oxide Nanodispersion Type B-Anionic (70nm)	1314-13-2	M.W. 81.38, APS: 70nm, 50wt% in H ₂ O, colloidal dispersion with anionic dispersant	10gm & 25gm
74963	Zinc Oxide Nanodispersion Type C-Cationic (70nm)	1314-13-2	M.W. 81.38, APS: 70nm, 50wt% in H ₂ O, colloidal dispersion with cationic dispersant	10gm & 25gm

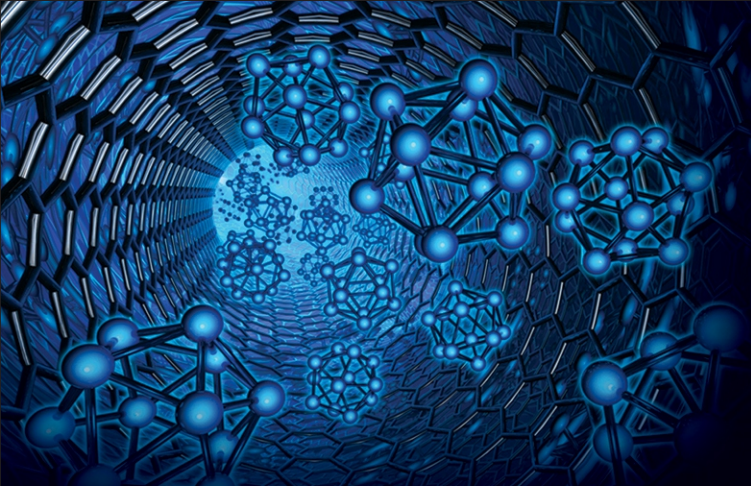
*Bulk pack sizes available on request

Mesoporous Nanopowders

Mesoporous Nanopowders are cutting-edge products having pore sizes with diameters ranging between 2 - 50nm. **SRL** offers various Mesoporous nanopowders which are used in Physical Chemistry and Biomedical research applications. Due to their properties such as controlled particle size, morphology, porosity & chemical stability, they are used for adsorption, catalysis, sensing & separation.

Product Code	Product Name	CAS No.	Product Description	Pkg
65048	Mesoporous Alumina Nanopowder (3D-Wormhole)	—	SSA (BET): 230-370 m ² /g, Avg BJH pore size: 6-20nm, Total pore volume: 0.36-1.51cc/g	1gm
19366	Mesoporous Carbon Nanopowder (CMK-3 Type)	7440-44-0	Size: 0.5~5µm, Micropore volume - 0.29cc/g, SSA (BET): ~800 m ² /g, Pore diameter: 3.9nm, Total pore volume: 1.35cc/g	100mg & 250mg
63876	Mesoporous Silica Nanopowder (3D-Cubic MCM-48 Type)	1317-33-5	Average BJH Pore size: 2.1nm, SSA (BET): 1600 m ² /g, Framework pore volume: 0.85 cc/g Total pore volume: 1.1 cc/g	250mg & 500mg

*Bulk pack sizes available on request



Product Code	Product Name	CAS No.	Product Description	Pkg
83881	Mesoporous Silica Nanopowder (1D-Hexagonal SBA-15 Type)	1317-33-5	Average BJH Pore size: 8.5nm, SSA (BET): 718 m ² /g, Framework pore volume: 0.90 cc/g, Total pore volume: 0.93 cc/g	250mg & 500mg
97621	Mesoporous Silica Nanopowder (1D-Hexagonal SBA-41 Type)	1317-33-5	Average BJH Pore size: 2.4nm, SSA (BET): 1050 m ² /g, Framework pore volume: 0.79 cc/g, Total pore volume: 0.92 cc/g	250mg & 500mg

*Bulk pack sizes available on request

Specialized Graphene Nanoproducts

After CNT's, Graphenes are considered as the "Next Big" thing in the fields of Physics, Chemistry, and Material Science. With its interesting properties of High Specific Surface Area, Mobility, Thermal and Good Electrical Conductivity, **SRL** offers Graphene as Functionalized Nanopowders, Platelets, Single Layered and as Quantum Dots. Graphene Nanoproducts have applications in (opto) electronics, sensors, catalysts and as structural materials.

CAS: 7782-42-5

Product Code	Product Name	Product Description	Pkg
89922	Graphene Carboxyl (GCOOH) Nanopowder	M.W. 12.01, Assay – min.99%, APS: 1-5µm, Thickness: 0.8-1.2nm, Carboxyl ratio: 5.0%	25mg & 100mg
59927	Graphene Industrial-Quality (GIQ) Nanopowder <i>Preparation method: Thermal exfoliation reduction</i>	M.W. 12.01 Assay – min.98%, Thickness: ~3.0nm, SSA (BET): ~600 m ² /g, Electrical Resistivity: ~0.30 Ωcm ⁻¹	100mg & 500mg
87185	Graphene Nitrogen-doped (GNdp) Nanopowder	M.W. 12.01 Layers: 1-5 atomic layer graphene nanosheets, Lateral size (µm): 0.5-5, SSA (BET): 500~700m ² /g, Conductivity: >1000 S/m (characterized at density of 0.3g/cm ³)	250mg
55093	Graphene Platelet Nanopowder (GPN Type 1)	M.W. 12.01 Carbon – min.99.5%, APS: 15 micron, Thickness: 6-8 nm, Surface area: 150 m ² /g, Appearance: Black granules, Bulk density: 0.03-0.1 g/cc, Oxygen content: < 1%, Residual acid content: <0.5 wt%	1gm , 5gm & 25gm
36529	Graphene Platelet Nanopowder (GPN Type 2)	M.W. 12.01 Carbon – min.99.5%, APS: 15 micron, Thickness: 11-15 nm, Surface area: 50-80 m ² /g, Appearance: Black granules, Bulk density: 0.03-0.1 g/cc, Oxygen content: < 1%, Residual acid content: <0.5 wt%	1gm , 5gm & 25gm
98585	Graphene Platelet Nanopowder (GPN Type 3)	M.W. 12.01 Carbon – min.99.5%, APS: 15 micron, Thickness: 2-10nm, Surface area: 20-40 m ² /g, Appearance: Black grey powder, Bulk density: 0.10g/ml, Water content <0.5%, Residual impurities <0.5 wt%, Electrical conductivity: 80000S/m, Tensile strength: 5Gpa	1gm , 5gm & 25gm
73949	Single Layer Graphene Factory (SLGF) Nanopowder	1-5 atomic layer graphene nanosheets Assay – min.98%, SSA (BET): 650~750 m ² /g, Conductivity: 500~700 S/m, Lateral size: 0.5-5µm	100mg & 250mg
27944	Single Layer Graphene (SLG) Nanopowder <i>Preparation method: Thermal exfoliation reduction + Hydrogen reduction (Modified hummer's method)</i>	Assay – min.98%, Graphene with high surface area, SSA (BET): 400~1000 m ² /g, Electrical Resistivity: ~0.30 (Ωcm ⁻¹), Dispersible property: Can be redispersed in most solvents with the help of sonication	100mg & 250mg
49888	Single Layer Graphene Oxide (SLGO) Nanopowder <i>Preparation method: Modified hummer's method</i>	M.W. 12.01, Assay – min.99%, APS: 1-5µm, Thickness 0.8-1.2nm, Single layer ratio: 99%	25mg & 100mg

*Bulk pack sizes available on request

CAS: 7440-40-0

53927	Graphene Quantum Dots (1mg/ml) (GQD) <i>Preparation method: Bottom-up method</i>	The solution of GQDs emits blue light (460 nm) when excited with 365nm UV beam. C M.W. 12.01 Assay – ~80%, Quantum Dots Size: ~15nm, Thickness 0.5-2nm	5ml & 25ml
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*Bulk pack sizes available on request

For more information and product prices, please contact your local SRL Authorized Stockist or mail us at info@srlchem.com

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