

# TECHNICAL DATA SHEET

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## PRODUCT: GRAPHENE [GRP-ALL GRADES UPTO LAYERS 20]

### General Characteristics: Nano Graphene

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**GRAPHENE** are 1-4 layered aggregates of the sub-micron sheet with a lateral dimension of 5 microns with high aspect ratio about 1000 up to >98% carbon content along-with natural presence of other entities. Greyish black flake products are in the form of powder and seek unlimited application. **Graphene** has almost zero band gap and can be used for such applications where un-doped & pure graphene are required with less defects. This is produced by Chemical exfoliation proprietary equipment & method.

### Advantages Graphene

- High aspect ratio
  - Defects free
  - Can be fine tuned with the band gap
  - Ultimately High Purity
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PARAMETER	SPECIFICATIONS
VISUAL	: Fluffy, Light Powder
COLOUR	: Match Standard, Black
MOISTURE	: ≤ 1.00%
SOLIDS	: ≥ 99.90%
TRUE DENSITY	: ≤ 0.3-0.08 g/cm <sup>3</sup>
SPECIFIC SURFACE AREA	: ≥ 110-800 m <sup>2</sup> /g
CARBON BY WT%*	: 60% - 80%
HYDROGEN BY WT%*	: ≤ 2.00%
NITROGEN BY WT%*	: ≤ 0.50%
OXYGEN BY WT%*	: 10% - 30%
ASH BY WT%*	: ≤ 0.050%
Thermal conductivity	: 3000watts /m-k [parallel to surface] 6 watts/m-k [perpendicular]
Tensile Modulus	: >1000 GPA
Tensile strength	: >5 GPA
Thermal Conductivity	: 10/7 Siemens/m
Bulk Density	: 0.30-0.08 Gms/cc
Diameter X & Y Dimension	: 5-10 micron
Thickness Avg Z dimension	: 2-15 nm
Purity	: >99%
Number of layers	: 1-15 average
Surface Area	: 115 – 800 sq. meter

## **Graphene Uses:**

**Electronic, EMI shielding, RF-Coating, RFID antenna, Sensors, Mobile touch pad, OLED & research.**

**Graphene** has been successfully implemented and is recommended for following areas. Although the main users are: Academic research centers, Defense laboratories AND Industries covering-Composite /Structural materials, Paint &Coating, Energy, Biomedical, Electronics etc.

Protective Structural Materials (as  
Nano-fillers and Nanocomposites)  
Fuel (Cryogenic) Tanks  
EM Shielding  
Ballistic/fragment protection  
Engine and turbine components  
Protective Elastomer components  
Reinforcement of polymers[Epoxy]  
Tier/Tyre

Transparent Conductive Film  
Organic Photovoltaic cells  
Organic light emitting diodes  
Sensors & Catalysts  
Liquid Crystal Displays  
Touch screens  
Conductive films  
Conductive plastic  
Transparent conductive coatings

Energy Storage & Electric Devices  
Solar energy  
Super capacitors  
Li-ion batteries  
Integrated circuits  
Electrochromic devices  
MEMS & NEMS, Nano-electronics,  
Field-effect transistors

Anti-microbial, Chemical, & Thermal  
Anti-bacterial paper  
Air & water purification  
Chemical & explosive detecting sensors  
Microbial detection & diagnosis devices  
E-papers & Conductive inks  
MICR inks  
Thermal management & interfacial materials

**We provide stable dispersion of Graphene in water, and other common organic solvent including ethanol, DMF, IPA, and Resins etc.**

*Performed by an accredited Outside Test Facility \**

*KNVS Inc. believes this information to be accurate as of the publication date. KNV'S INC. assume no liability for the information in this technical data sheet. KNVS INC encourages its customers to review the manufacturing processes and applications for their product from the standpoint of human health and environmental quality to ensure that this material is not utilized in ways for which it is not intended or tested. No warranties on any of the specifications are given. Product literature and material data sheets should be consulted prior to use.*

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