HYDROGRAPH

IGNITING MATERIAL CHANGE

CONDUCTIVE COMPOUNDS

WITH FRACTAL GRAPHENE™

MORE CONDUCTIVITY. LESS FILLER.
BETTER COST-PERFORMANCE.



Material OVERVIEW

HydroGraph's Fractal Graphene™ (FGA-1) helps manufacturers make more competitive conductive compounds with higher performance, less conductive filler and lower cost. Combined with conductive carbon black, high-purity FGA-1 forms a hybrid system with a more effective conductive network, delivering the performance advantages of graphene in the most efficient and economical way.

FGA-1 is added at ultra-low loadings and replaces part of the carbon black. With the addition of FGA-1, total conductive filler and filler cost can be lowered while conductivity is maintained, or conductivity can be increased at the same total conductive filler loading. Lower loadings also improve flow, ease processing and better preserve mechanical properties.

Manufacturers can reach demanding conductivity vs loading targets by building on their existing carbon black formulations, without a complete reformulation.

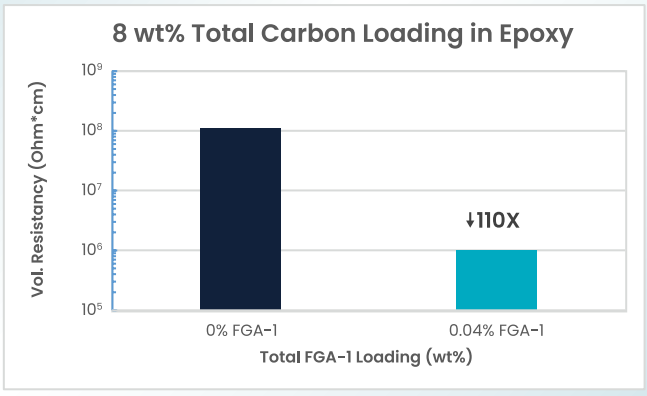
Applications

- ESD protection and electronics packaging
- Anti-static molded and extruded parts
- Conductive parts for electrostatic painting
- Fuel-system and fluid-handling components
- Static-dissipative containers and packaging

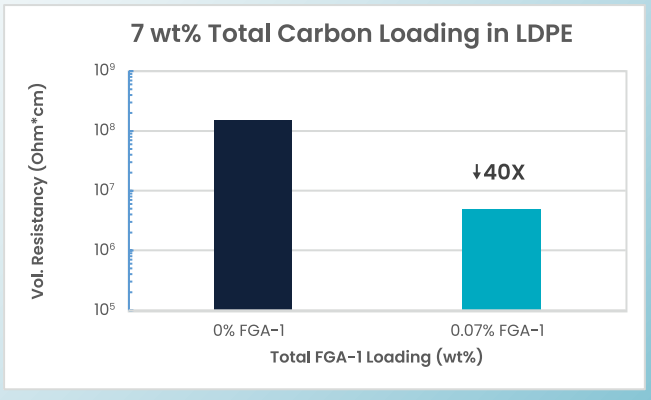
Cost Performance

Ultra-low FGA-1 additions replace part of the carbon black, cutting conductive-carbon use by 22–50% and costs by 8–22% in illustrative formulations, without sacrificing conductivity.

Fractal Graphene Enhancement



110X reduction in volume resistivity with **0.04wt%** FGA-1 loading



40X reduction in volume resistivity with **0.07wt%** FGA-1 loading

Greater than the sum of its parts. Far more conductivity at equal carbon, or the same with less carbon for easier processing and intact mechanicals.

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HydroGraph Products

Fractal Graphene™

Pristine turbostratic graphene of unsurpassed purity, identical batch-to-batch consistency and lowest environmental footprint.

- Pristine structure (100% sp^2 hybridized)
- 99.8% carbon, 0.2% O_2 with no PAHs
- Thickness: 2-3 nm (average 6 layers)
- Lateral dimensions: 20-50 nm
- Bulk mass density: 70-100 mg/cc
- BET specific surface area: 130-180 m^2/g
- Composed of fractal aggregates of monomers (primary particles)
- Very dark, black, hydrophobic powder

Reactive Graphene™

Functionalized turbostratic graphene featuring precise functional chemistry, identical batch-to-batch consistency and the lowest environmental footprint.

- Surface decorated with carboxylic acid (-COOH) functional groups
- 96.3% carbon, 2.1% O_2, 1.6% H, no PAHs
- Thickness: 2-3 nm (average 6 layers)
- Lateral dimensions: 10-50 nm
- BET specific surface area: 130-180 m^2/g
- Composed of fractal aggregates of monomers (primary particles)
- Dark, black, hydrophilic powder

Fractal Graphene Paste™

Pre-dispersed, stabilized, concentrate of high-purity few-layer graphene, ready-to-use in aqueous systems using standard mixing equipment.

- Aqueous dispersion of FGA-1
- 20% concentration
- D50 particle size of 35 nm
- Approximately 6 layers
- Zeta Potential -45 mV
- Shelf-stable for 2+ years
- Flowable black liquid

The HydroGraph Advantage

Superior Quality

Highest purity graphene material in the market, exceptional particle size uniformity, identical batch-to-batch consistency, for unbeatable quality and reliability.

Ultra-low Addition Rates

Achieves exceptional performance at concentrations 10-100x lower than conventional graphene nanoplatelets, fundamentally transforming the economics for graphene technology.

Sustainable Advantage

Improves resource efficiency, reduces GHG emissions, inherently lowest energy footprint and carbon footprint graphene available.

The Future is Fractal

The fractal structure—unique to HydroGraph's graphene—provides performance advantages that cannot be replicated by conventional graphenes. As industries increasingly seek sustainability by doing more with less, Fractal Graphene™ stands ready to transform the way products are formulated and manufactured.

Contact HydroGraph today to learn how Fractal Graphene™ can enhance your products and processes.



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