PROC-X

MANUPACTURING CROUP

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FROM GRAPHITE TO GRAPHENE

THE TRANSFORMATION OR FAILURE

How Proc-X Manufacturing Group Leads the Industry to Ensure Success

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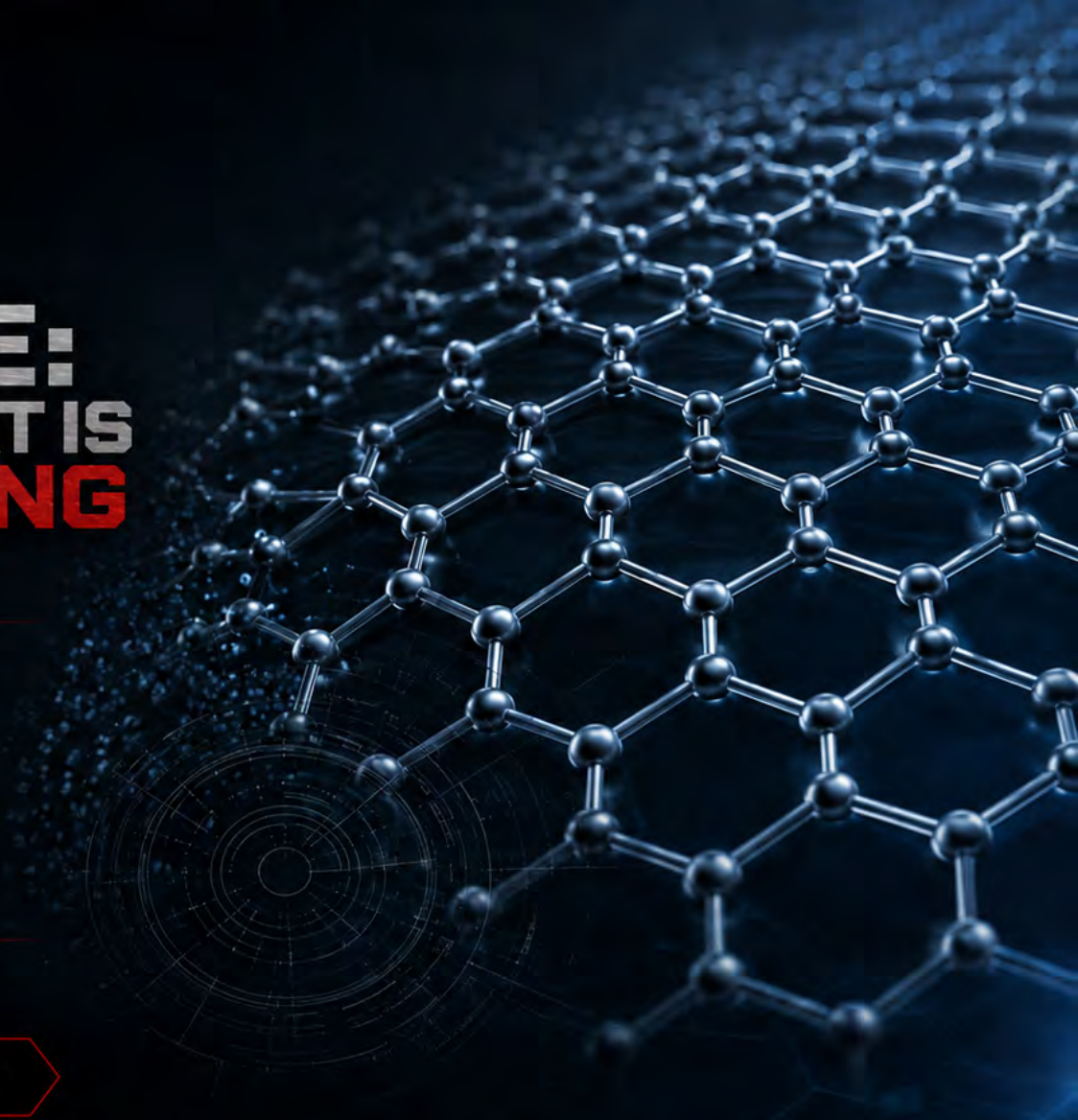
GRAPHENE: A MATERIAL THAT IS TRANSFORMING THE WORLD



EXCEPTIONAL STRENGTH
Stronger than steel by more than 200 times, yet incredibly lightweight and flexible.

SUPERIOR CONDUCTIVITY
Outstanding electrical conductivity enables faster, more efficient energy and data transfer.

SUPERIOR THERMAL PERFORMANCE
High thermal conductivity allows for excellent heat dissipation in demanding applications.

From next-generation electronics and energy storage to aerospace, automotive, and advanced composites, graphene is unlocking possibilities that redefine performance and innovation.

THE CHALLENGE IS NOT THE POTENTIAL— IT IS THE PROCESS.

Producing high-quality graphene at scale is complex, requiring precise control over material properties, consistency, and cost. The path from lab-scale promise to industrial-scale performance depends on the process.

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THE JOURNEY FROM GRAPHITE TO GRAPHENE

1. RAW GRAPHITE
2. PRE-TREATMENT & PURIFICATION
3. EXFOLIATION & DELAMINATION
4. SEPARATION & PURIFICATION
5. GRAPHENE READY FOR APPLICATION

EACH STEP IS CRITICAL. SMALL MISSTEPS LEAD TO BIG FAILURES.

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WHY MANUFACTURERS OFTEN FAIL

- Inconsistent Raw Materials
- Ineffective Exfoliation
- Overheating & Degradation
- Poor Dispersion & Restacking
- Complex Scale-Up
- Lack of Process Integration
- Inefficient Solvent & Water Removal

The result? Low yield, poor quality, high cost, and unmet performance.

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SUCCESS STARTS WITH PROCESS INTELLIGENCE

Success requires more than advanced materials.
It demands understanding the science—and controlling every variable in execution.

From material behavior to environmental conditions, from equipment performance to process parameters, Proc-X delivers clarity, control, and consistency at every step.

Proc-X engineers complete, integrated systems that work in harmony to maximize yield, ensure quality, and scale with your ambition. Because when you control the process, you control the outcome.

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THE PROC-X DIFFERENCE

ENGINEERING EXCELLENCE

Advanced material science and precision engineering deliver innovative, high-performance solutions.

PROCESS INTEGRATION

Streamlined systems and seamless integration maximize efficiency and reduce downtime.

SCALABILITY

Flexible capabilities and modular solutions designed to grow with your business.

QUALITY & CONSISTENCY

Rigorous quality control ensures reliable, repeatable results in every batch.

GLOBAL SUPPORT

Expert support and responsive service, wherever your operations take you.

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OUR INTEGRATED SOLUTIONS FOR GRAPHENE PRODUCTION

End-to-end process equipment engineered to maximize efficiency, ensure consistency, and preserve graphene quality.

HIGH-SHEAR MIXERS

Achieve uniform dispersion and optimal exfoliation for consistent graphene suspensions.

HIGH-PRESSURE HOMOGENIZERS

Reduce particle size, break down agglomerates, and enhance stability for superior performance.

VACUUM PLOW MIXERS / DRYERS

Remove water and solvents at low temperature under vacuum conditions to preserve graphene quality.

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STAGE 1: PRE-TREATMENT & PURIFICATION

- REMOVE IMPURITIES AND IMPROVE EXFOLIATION EFFICIENCY
- CONTROLLED MILLING & CLASSIFICATION
- PURIFICATION TO ENHANCE PURITY AND PERFORMANCE

DP *Mills & Milling Systems*

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STAGE 2:
EXFOLIATION & DELAMINATION

- High-shear mixing for initial exfoliation
- High-pressure homogenization for layer delamination
- Controlled energy input to prevent damage

EmuXion High-Shear Mixers & High-Pressure Homogenizers

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STAGE 3:
SEPARATION & PURIFICATION

- REMOVE UNEXFOLIATED MATERIAL
- CENTRIFUGATION AND FILTRATION FOR SIZE CONTROL
- SOLVENT EXCHANGE AND WASHING

QuantumX CENTRIFUGES & FILTRATION SYSTEMS

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STAGE 4: SOLVENT RECOVERY & DRYING

- Efficient solvent recovery
- Vacuum drying for high-quality graphene powder
- Low-temperature moisture removal
- Prevents re-agglomeration and contamination

QuantumX VACUUM PLOW MIXERS / DRYERS

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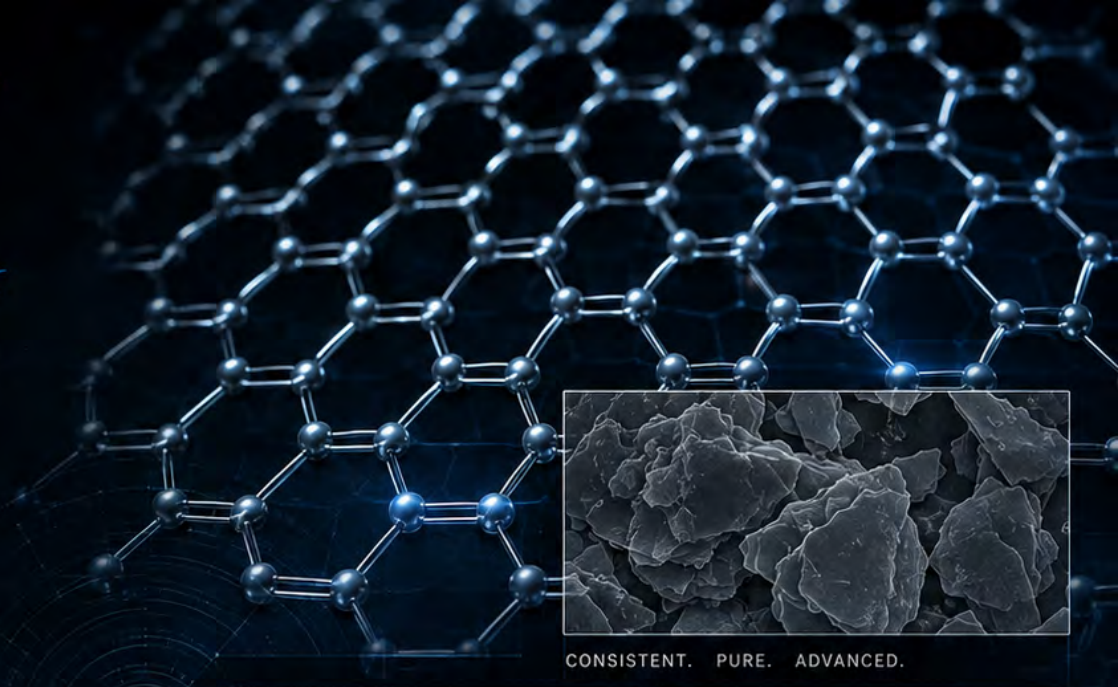
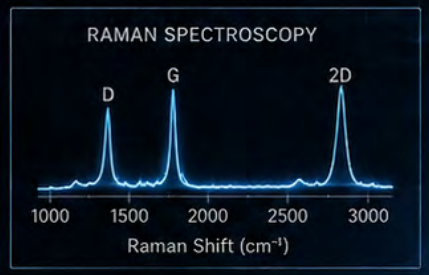
QUALITY YOU CAN TRUST

At Proc-X, quality isn't just a standard — it's our foundation. Every batch of graphene we produce is engineered, measured, and validated to deliver unmatched consistency and performance.

- Consistent layer thickness & size
- High purity & conductivity
- Maximum yield & performance
- Reproducible batch after batch
- **Tested. Verified. Proven.**



CONSISTENT. PURE. ADVANCED.



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APPLICATIONS OF HIGH-QUALITY GRAPHENE

High-quality graphene unlocks exceptional performance across a wide range of industries.

Its unique combination of strength, conductivity, flexibility, and large surface area enables next-generation solutions that drive innovation and solve real-world challenges.

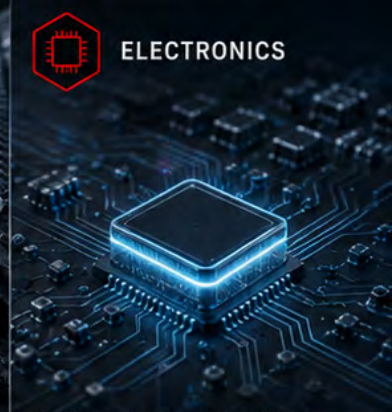
ENERGY STORAGE

Enhances conductivity, capacity, and cycle life in lithium-ion batteries and supercapacitors.

COMPOSITES

Improves mechanical strength, reduces weight, and increases durability of advanced materials.

ELECTRONICS



Enables faster, smaller, and more efficient electronic devices with superior thermal management.

COATINGS & FILMS

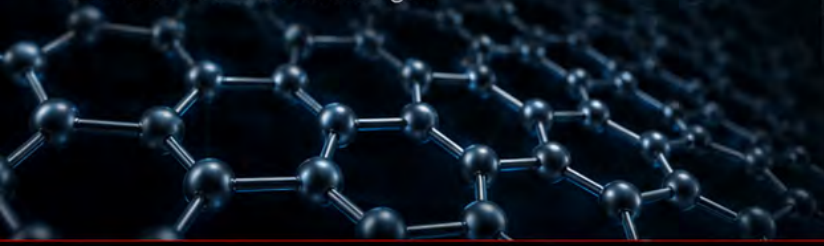
Provides barrier protection, anti-corrosion, and enhanced mechanical and thermal properties.

PHARMACEUTICALS

Supports drug delivery, bioimaging, and therapeutic applications with high biocompatibility.

SENSORS

Delivers ultra-sensitive detection for chemical, biological, and environmental monitoring.



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SCALABLE FROM LAB TO PRODUCTION

Proc-X supports the full path from development to commercial scale with integrated systems, process expertise, and scalable engineering.

R&D / LAB

Explore. Innovate. Validate.

- Lab-scale systems for material development and process screening
- Rapid iteration and data-driven optimization

PILOT

Optimize. Refine. De-Risk.

- Pilot-scale systems for process optimization and parameter refinement
- Generate reproducible data and scale-up confidence

DEMO

Validate. Demonstrate. Prepare.

- Demo-scale systems to validate performance at scale
- Prove ROI, performance, and commercial viability

PRODUCTION

Produce. Perform. Scale.

- Full-scale, integrated systems designed for continuous commercial production
- Engineered for reliability, efficiency, and global impact

ONE PARTNER. ONE PATH. ENDLESS POSSIBILITIES.

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YOUR PARTNER IN GRAPHENE INNOVATION

From concept to commercialization,
Proc-X provides the technology, expertise,
and support you need to succeed.

**We do not just supply equipment—
we deliver results.**

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ENGINEERING SUCCESS.
TRANSFORMING POSSIBILITIES.

From graphite to graphene — **Proc-X** delivers the process,
the equipment, and the expertise to help manufacturers succeed.

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