CVD Equipment Corporation provides a range of FirstNano® advanced research and development chemical vapor deposition process tools for universities, startups, and industry research laboratories.

The systems are designed to meet today’s safety standards for handling pyrophoric, corrosive, flammable, and toxic gases such as hydrogen, silane, germane, diborane, hydrogen chloride, and metal organic precursors. All our systems are designed with exhausted metal cabinet enclosures which contain the reactor, furnace, power control, gas distribution, and electrical systems. The systems are engineered with ease of access to all components for maintenance purposes.

FirstNano® systems are powered by CVDWinPrC™, our proprietary realtime instrument control, data logging, and process editing software suite. CVDWinPrC™, included as standard, is equivalent to the package included with our industry-ready production equipment. A web interface connection allows for remote training, software upgrades, and system troubleshooting.

Our SDC® ultra-high purity gas lines and delivery systems are manufactured at our Stainless Design Concepts location in upstate New York. We take advantage of a 4,000 ft² clean room fabrication facility, with multiple high purity orbital welding stations.

Our manufacturing is vertically integrated; we procure raw materials and deliver finished systems. Contact us to schedule a visit to our facility on Long Island, New York, where you can witness our quartz fabrication, machining, and build/test facilities.

FirstNano® systems can be configured with a range of modules to meet the often unique requirements of the R&D environment. More information can be found by visiting our website at www.firstnano.com.

Gas Delivery Cabinets
The FlexGas® and CipherCon™ 1500 gas cabinets are designed to cover a wide range of gas delivery applications. In its simplest form, the CipherCon™ gas cabinet houses 1, 2, 3, or 4 gases, and includes a high purity, manual gas panel for each gas.

UHP Panels
Our MicroLine™ UHP manual gas panels are designed for high and low pressure, ultra-high purity (UHP) gas delivery. Typically used for non-hazardous purge and process gas delivery applications, the MicroLine™ Series offers 1, 2, 3, 4, and 6-valve designs.

Abatement
Our Exhaust Gas Conditioning (EGC) systems will thermally decompose explosive, flammable, and pyrophoric exhaust gases. The wet scrubber removes particles from the exhaust stream. The systems include optional neutralization of corrosive effluent.

“The turnkey EasyTube® System is the most practical and convenient instrument for solutions in nanostructure synthesis.”

DR. WONBONG CHOI
Professor of Mechanical & Materials Engineering
Florida International University

CVD Equipment Corporation offers our FirstNano® R&D CVD processing systems with support equipment such as gas cabinets and exhaust gas conditioning systems. All major components from one vendor make component interfacing seamless.

Call us at +1 631-981-7081 to discuss a product solution for your project. We can also be reached at sales@firstnano.com or visit our website.
EasyTube® 101 Features

- CVDWinPC™ system control software for realtime process control, data logging, and recipe editing
- Preprogrammed process recipes and startup support
- Substrate area 25 mm x 50 mm
- Cantilevered automatic substrate loading/unloading system
- Up to 8 MFC-controlled gas lines and 3 liquid/solid sources
- Atmospheric and/or low pressure process configurations available
- Dual o-ring process seals with a vacuum monitoring system to ensure leak free operation
- 3-zone resistance furnace for temperatures up to 1100 °C
- Proprietary realtime cascade process temperature control
- User ability to set warnings and alarms
- Comprehensive software and hardware safety interlocks

EasyTube® 2000 Features

- CVDWinPC™ system control software for realtime process control, data logging, and recipe editing
- Preprogrammed process recipes and startup support
- Substrate sizes up to 50 mm x 50 mm
- Cantilevered automatic substrate loading/unloading system
- Up to 8 MFC-controlled gas lines and 3 liquid/solid sources
- Atmospheric and/or low pressure process configurations available
- 3-zone resistance furnace for temperatures up to 1100 °C or optional rapid thermal processing with IR heater
- Proprietary realtime cascade process temperature control
- High throughput with FastCool™ furnace
- User ability to set warnings and alarms
- Comprehensive software and hardware safety interlocks

EasyTube® 3000 Features

- CVDWinPC™ system control software for realtime process control, data logging, and recipe editing
- Preprogrammed process recipes and startup support
- Substrate sizes up to 100 mm x 100 mm (batch processing of multiple wafers per run also possible)
- Cantilevered automatic substrate loading/unloading system
- Up to 16 MFC-controlled gas lines and 4 liquid/solid sources
- Atmospheric and/or low pressure process configurations available
- 3-zone resistance furnace for temperatures up to 1200 °C or optional IR / RF heating
- Proprietary realtime cascade process temperature control
- High throughput with FastCool™ furnace
- User ability to set warnings and alarms
- Comprehensive software and hardware safety interlocks

EasyTube® 3000EXT Features

- CVDWinPC™ system control software for realtime process control, data logging, and recipe editing
- Preprogrammed process recipes and startup support
- Substrate sizes up to 150 mm x 150 mm (batch processing of multiple wafers per run also possible)
- Loadlock / glovebox options
- Cantilevered automatic substrate loading/unloading system
- Up to 16 MFC-controlled gas lines and 4 liquid/solid sources
- Atmospheric and/or low pressure process configurations available
- 3-zone resistance furnace for temperatures up to 1200 °C or optional IR / RF heating
- Proprietary realtime cascade process temperature control
- High throughput with FastCool™ furnace
- User ability to set warnings and alarms
- Comprehensive software and hardware safety interlocks

EasyTube® 6000 Series Features

- Mounting choices: left hand, right hand, bulkhead, ballroom
- Up to 4 process tubes
- CVDWinPC™ system control software for realtime process control, data logging, and recipe editing
- Wafer sizes: 3 tube stack = 200 mm | 4 tube stack = 150 mm
- Up to 100 wafers per load (process dependent). Larger loads are available upon request
- Cantilevered automatic substrate loading/unloading system
- Up to 6 MFC-controlled gas lines and 1 liquid/solid source per process tube
- Atmospheric and/or low pressure process configurations available
- 3-zone resistance furnace for temperatures up to 1200 °C
- Proprietary realtime cascade process temperature control
- User ability to set warnings and alarms
- Comprehensive software and hardware safety interlocks

Gas Delivery & Exhaust Abatement

MicroLine™ UHP manual gas panels are designed for high and low pressure, ultra-high purity (UHP) gas delivery. Typically used for non-hazardous purge and process gas delivery applications, the Simplicity™ Series offers 1, 2, 3, 4, and 6-valve designs.

FlexGas™ and CiphercoN™ 1500 gas cabinets house 1, 2, 3, or 4 gases, and include high purity, manual gas panels for each gas.

The EGC burn box will thermally decompose explosive, flammable, and pyrophoric exhaust gases. The wet scrubber removes particles from the exhaust stream. The EGC pyrolyzer + wet scrubber includes optional neutralization of corrosive effluent.

There are more options available on any of these models. Please consult factory for details.
### Nanomaterials SEM Gallery

Materials developed using a FirstNano® EasyTube® system

<table>
<thead>
<tr>
<th>Carbon Nanotubes</th>
<th>Graphene</th>
<th>Nanowires</th>
<th>Transitional Metal Dichalcogenides</th>
</tr>
</thead>
<tbody>
<tr>
<td>VERTICALLY ALIGNED CNTs</td>
<td>3D GRAPHENE FOAM</td>
<td>SILICON NANOWIRES</td>
<td>2D MOLYBDENUM DISULFIDE</td>
</tr>
<tr>
<td>HORIZONTALLY ALIGNED CNTs</td>
<td>SINGLE LAYER GRAPHENE</td>
<td>ZINC OXIDE NANOWIRES</td>
<td>TMDs ON SILICON WAFER</td>
</tr>
<tr>
<td>CARBON NANOTUBE PAPER</td>
<td>SINGLE CRYSTAL GRAPHENE</td>
<td>GALLIUM NITRITE NANOWIRES</td>
<td>TMDs ON SILICON WAFER</td>
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<tr>
<th>Processes</th>
<th>ET101</th>
<th>ET2000</th>
<th>ET3000</th>
<th>ET3000EXT</th>
<th>ET6000</th>
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<tr>
<td>Carbon Nanotubes</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Graphene</td>
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<tr>
<td>2D Materials (TMDs, h-BN, etc)</td>
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<tr>
<td>Semiconducting Nanowires (Si, Ge, ZnO, GaN, etc)</td>
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<tr>
<td>Transparent Conductive Oxide (SnO:F, ZnO:B, etc)</td>
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<tr>
<td>Epitaxial Deposition</td>
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<tr>
<td>Atmospheric Pressure CVD (APCVD)</td>
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<tr>
<td>Low Pressure CVD (LPCVD)</td>
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<td>Metal Organic CVD (MOCVD)</td>
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<td>Plasma Enhanced CVD (PECVD, PACVD, ICP-CVD)</td>
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All systems include CVDWinPrC™ system control software, comprehensive software and hardware safety interlocks, preprogrammed process recipes, and startup support. Other configurations available, consult factory for details.