

# Research and Development MOCVD Tool: GaNomite™

Structured Materials Industries, Inc. (SMI) has released a new series of **SpinCVD™** reactors and systems for MOCVD and Chloride assisted AlInGaN film deposition. The tool series is the **GaNomite™**. These systems are geared to economically address researcher to manufacturer research and development needs alike. **GaNomite™** systems represent an advancement in state-of-the-art nitride MOCVD reactors. The **GaNomite™** implements the benefits of **SpinCVD™** high speed rotation to streamline gas flows, marries the benefits of multi-zone substrate heating with relatively close spacing of the showerhead to the deposition plane combined with direct control of distribution of reactants to minimize pre-reactions while maximizing efficiency and uniformity of thickness and composition. Combined with

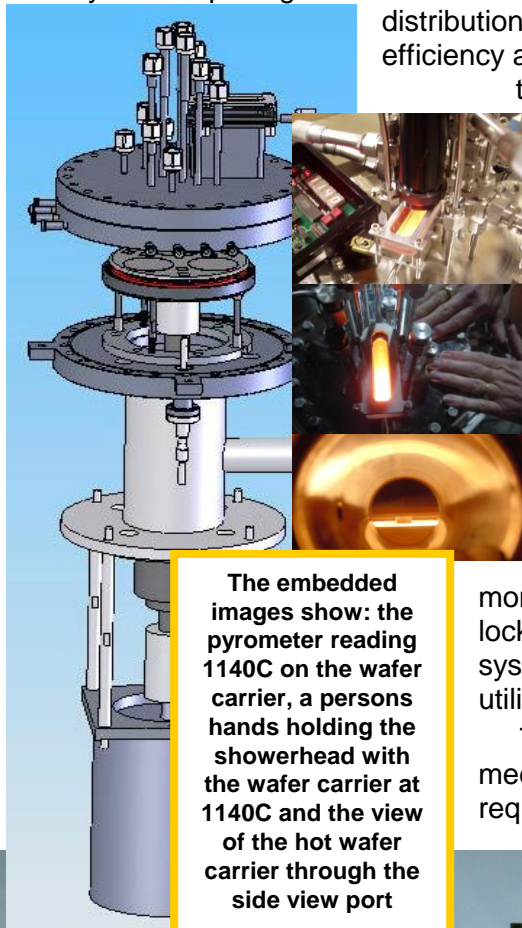
these features are a unique patent pending showerhead with integrated high heat load water cooling to further prevent gas pre-reactions and a unique robust patent pending substrate heating assembly. Importantly, the showerhead supports a wide range of optical in-situ monitors. While minimum pre-reactions means maximum uptime, the reactor as a whole is designed for simple servicing to minimize downtime. The system also offers a patent pending chloride assisted deposition mode option.

The system offers all the state-of-the-art features associated with modern MOCVD operation, including: real-time process monitors and controls, fast-pressure balanced gas and vapor switching manifold, pressure controlled idle/run bubbler sources, bubbler dopant dilution sources, option for in-situ mass transport monitoring, process, inert and reducing gas purifiers, a load-locked wafer platter transfer system, dry or wet pumping systems, unified framing with door and access panels, and utilities among several other features.

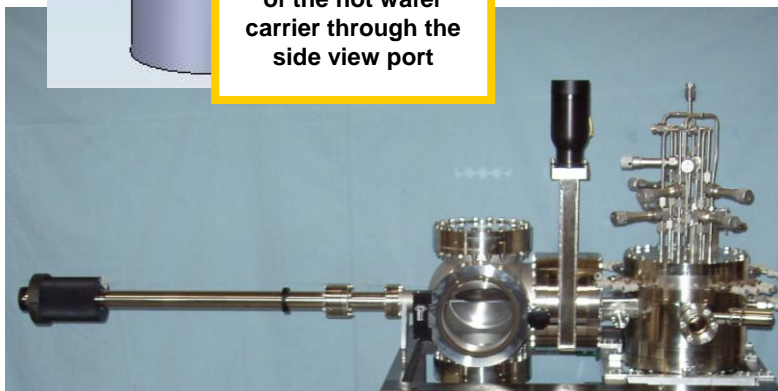
The SMI **GaNomite™** system is designed to adapt from meeting the researchers needs to manufacturers production requirements.

## Advanced System Features

- Most advanced reactor/showerhead design
- Patent Pending **GaNomite™** showerhead & heater assembly (through 1600C)
- In-situ* process monitoring
- Wafer transfer system, Exhaust system
- R&D to production scalability
- 5" to 16" diameter wafer carriers
- (3x2" wafers to 8x2" wafers standard)
- Gas, Bubbler & Dilution sources
- Super-fast pressure and flow balanced switching manifolds
- Gas purification systems
- Integrated utilities and electronics framing



The embedded images show: the pyrometer reading 1140C on the wafer carrier, a persons hands holding the showerhead with the wafer carrier at 1140C and the view of the hot wafer carrier through the side view port



## STRUCTURED MATERIALS INDUSTRIES, INC.

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# Attributes of GaNomite™

## Advantages for Nitride MOCVD and Chloride Assisted MOCVD (CAMOCVD™)

- Independent radially distributed precursor injector (III's, V's, N's, carrier)
  - Increases efficiency & uniformity while minimizing pre-reactions
- *Patent pending* Showerhead face is water cooled
  - Minimizing pre-reactions & showerhead coatings
- No liquid cooling channel welds exposed to process gasses
  - Eliminates any potential H<sub>2</sub>O leaks into the reactor
- Full width optical access
  - Maximizes in-situ monitor options
- Uniform carrier gas flow
  - Maximizing uniformity & minimizing pre-reactions
- Close space vapor transport
  - Maximizing efficiency & minimizes pre-reactions
- Uniform *patent pending* multi-zone fatigue free heating
  - Maximizing uniformity & filament lifetime, & minimizing pre-reactions
- Unique low contamination high temperature filament assembly
  - Maximizing filament life & minimizes contamination
- Water cooled reactor & base plate
  - Keeps reactor clean
- High speed rotation
  - Maintains streamlined flow - maximizing efficiency & uniformity & preventing pre-reactions
- Short delivery lead time
  - Gets the customer up & running fast
- Optional patent pending chloride assisted deposition modules
  - for higher throughput higher purity depositions

**Easy conversion to other material systems, such as: III – V's, II-VI's, Chalcogenides, Diamond, GeS, SiGe, Carbides, Oxides & ALD operation**

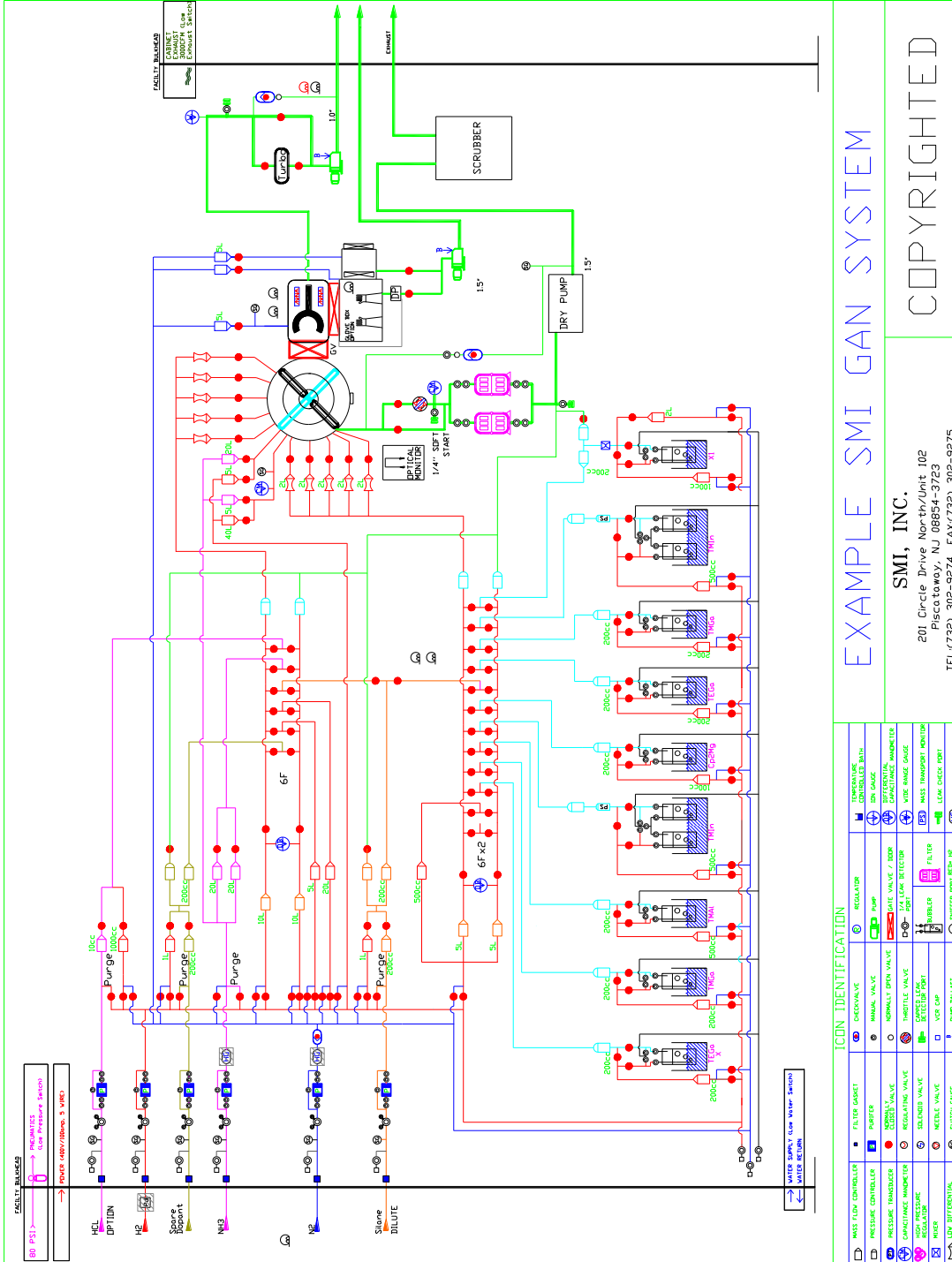


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# Typical GaNomite™ System Configuration



EXAMPLE SMI GAN SYSTEM

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