MBE Nitride Components & Systems
Enabling Tomorrow’s Devices Today.
Nitride-based semiconductors are used in many optical applications such as LEDs and Laser Diodes, and more recently in high power RF applications. In order to achieve high performance optical and electrical devices, it is critical to have the right components and systems that are optimized for nitride applications.

Veeco has provided components for nitride applications for over 10 years, starting with the UNI-Bulb™ Nitrogen Plasma Sources and material specific Ga, In and Al SUMO® sources. Since that time, Veeco has added more MBE components to address the material delivery needs of this emerging material set, like the Valved Source for Mg and the ammonia injector.

In addition, Veeco offers MBE systems that are ideally suited for nitride applications. The GEN20™ R&D/Pilot-production MBE System and the GEN200™ Production MBE System both provide multiple pump ports with optimized pumping capacity as well as other various model specific features outlined here. The systems can also be tailored specifically for RF nitrogen MBE or ammonia-based MBE by utilizing the components featured here.

Veeco’s Process Integration Center (PIC) puts Veeco at the forefront of high volume manufacturing of GaN devices using MBE. A dedicated GEN200 is the industry’s largest MBE tool for nitride development and production. The benefit of the PIC includes in-house GaN process expertise, RF nitrogen plasma and ammonia-based product and process development and the ability to provide process proof of concept in a production environment.

Veeco’s extensive nitride component offering, coupled with the flexible and scalable system platform and PIC capabilities, will enable you to grow world class materials and manufacture nitride devices at the lowest cost.
Proven MBE Nitride Components

**SUMO Source for Ga and In**
Design provides excellent flux stability and uniformity along with significantly increased charge capacity, optional configuration for long life filaments to accommodate NH₃ environments.

**SUMO Source for Al**
Specific design for Al evaporation, incorporating an extended lip crucible, prevents material overflow while providing a large charge capacity and good thickness uniformity across the substrate.

**Valved Source for Mg**
A reproducible and efficient source for Mg doping of GaN enables abrupt doping profiles unattainable with conventional effusion sources. The ability to heat the conductance zone permits the beam flux to be thermally energized to temperatures beyond the typical evaporation range of Mg.

**UNI-Bulb RF Nitrogen Plasma Source (NEW Autotuner option)**
Each plasma source includes an endplate designed for the model-specific MBE system and particular growth conditions. Source comes with the Manual Tuner or the Autotuner option that automatically optimizes the plasma conditions.

**Material Specific Shutters**
Veeco provides multiple shutter blade designs based upon the nitride application—choices range from double-blade shutters, non-corrosive blades to standard blades like PBN and Ta.

**High Temperature Substrate Heaters**
Dual filament substrate heater for temperatures up to 1200°C T/C providing optimized heating uniformity and compatibility with ammonia.

**Ammonia Injector**
Low temperature ammonia injector provides uniform gas delivery and reduced consumption utilizing a custom nozzle based on system geometry.
Emerging compound semiconductor devices will depend heavily on MBE technology’s ability to make abrupt and precise interfaces at the atomic level in epilayers. As the world’s leading supplier of MBE components and systems, Veeco provides the critical first step in your device R&D and production.

Veeco benefits your operation further by offering the broadest portfolio of products to grow, process and measure compound semiconductors. No other company can offer you MBE, MOCVD, PVD, and IBD for deposition, and IBE for etch. Our atomic force microscopes and optical profilers let you characterize your epitaxial-grown wafers, as well as optimize your growth processes to increase device performance.

Plus, Veeco offers the industry’s most advanced Process Integration Center and applications lab network to get new devices to market faster, and provide the best solution for collaboration on device and equipment roadmaps. Currently, Veeco is working with various partners, both universities and corporations, on a variety of collaborative projects including nitride process optimizations, high-K dielectrics, ZnO and magnetic materials. Veeco is also involved in roadmap discussions with leading compound semiconductor and data storage corporations.

Finally, our financial strength and critical mass ensure we offer the industry’s most comprehensive MBE system and component service, as well as the most advanced MBE product fabrication capabilities for today and tomorrow. So make our MBE sources and systems your start to a successful partnership with the world’s leading supplier of equipment to the compound semiconductor industry—Veeco.

**MBE Nitride Application Notes**

Please contact the Veeco Sales Department and request a copy of the following application notes, or go to our web site www.veeco.com/mbe:

- Dec 2004, “The Use of a Valved Mg Source for Improved p-type Doping of MBE-Grown GaN”.
- Feb 2003, “The Veeco GEN930 MBE System with UNI-Bulb RF N Source for Plasma Assisted MBE of GaN”.
- May 2002, “Record Low Threshold Currents for 1.32 µm GaInNAs/GaAs Lasers”.

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