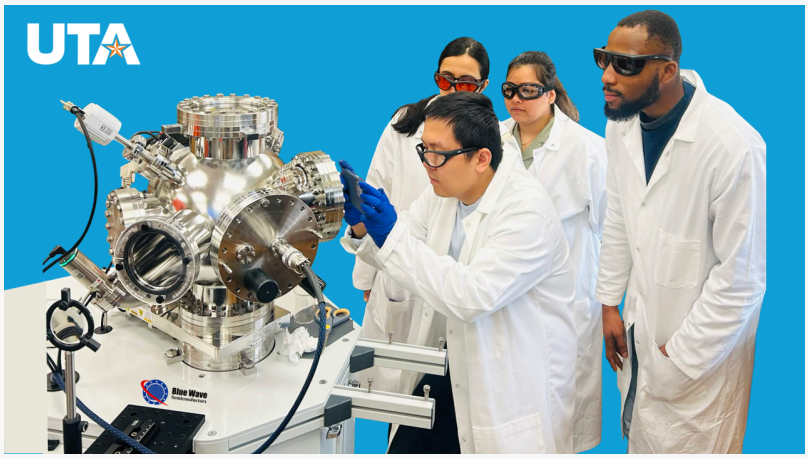
Blue Wave Semiconductors Introduces Pulsed Laser Deposition for Workforce Development in Advanced Thin Film Technology

Blue Wave Semiconductors has unveiled the Pulsed Laser Deposition (PLD) System, a PVD platform designed for the synthesis of high-quality thin films.



Blue Wave Semiconductors' PLD System being viewed by Prof. Di Zhang and researchers at University of Texas Arlington, USA.

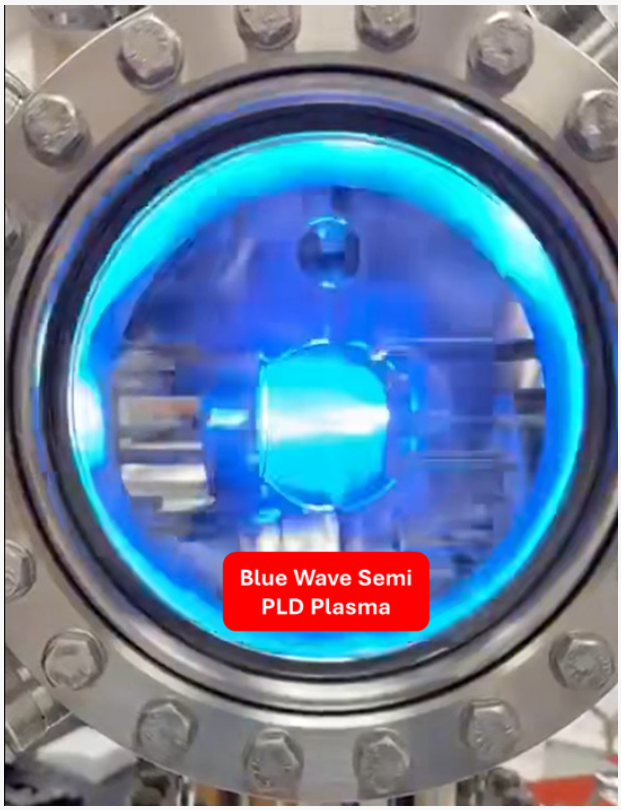
BALTIMORE, MD, UNITED STATES, May 8, 2026 /EINPresswire.com/ -- Blue Wave Semiconductors has unveiled its latest simplified design for a Pulsed Laser Deposition (PLD) System, an advanced physical vapor deposition platform engineered to support workforce development in semiconductor manufacturing and emerging quantum technologies. The system is specifically designed to provide students, researchers, and technical professionals with hands-on training in the fabrication of advanced thin-film materials and device structures critical to next-generation microelectronics, photonics, quantum sensing, and quantum computing applications. By offering a cost-effective, user-friendly, and industry-relevant deposition platform, Blue Wave Semiconductors aims to help strengthen the highly skilled technical workforce essential for sustaining innovation, domestic semiconductor manufacturing, and the rapidly growing quantum technology ecosystem.

Pulsed laser deposition (PLD) is a class of physical vapor deposition (PVD) in which a high-power pulsed laser beam (typically an Excimer laser operating in the UV range) is tightly focused inside a processing chamber through a UV-grade optical window. The laser-induced material interaction enables stoichiometric ablation of the selected target material. The ablated material, in the form of a plasma plume, deposits a thin film on a substrate such as silicon, sapphire, glass, or single-crystal polished substrates placed in front of the target.

The pulsed laser deposition process can occur in ultra-high vacuum or in the presence of background gas. The background gas helps balance the gas stoichiometry in the film and controls the velocities of depositing species, influencing intrinsic properties and stress levels

within the films. The energy of the laser pulse is utilized for electronic excitation, leading to physical processes such as evaporation, ablation, and the generation of high-density plasma composed of energetic atoms, ions, molecules, clusters, and particulates. The internal plasma energy allows the plasma plume to expand in vacuum or within a controlled gas environment before deposition on the substrate. The substrate is typically mounted on a precision-engineered Blue Wave substrate heater (2.1 Inch diameter, up to 850□C) designed for operation in both vacuum and reactive atmospheres at high temperatures. Single-crystal, epitaxial, highly oriented, and polycrystalline thin films with tailored functional properties—including optical, magnetic, piezoelectric, metallic, superconducting, and insulating characteristics—can be readily synthesized and engineered. These materials, along with multilayer heterostructures and device architectures, provide versatile platforms for advancing the understanding of fundamental materials science, chemistry, device physics, and quantum phenomena.

Blue Wave Semiconductors' PLD System



Plasma Plume produced by Blue Wave Semiconductors PLD system

The Blue Wave PLD System is specifically designed to meet the needs of university researchers and advanced material scientists by offering precise control over deposition parameters and material versatility. The system's precisely engineered target carousel and substrate heater ensure reliability, uniform thin-film deposition, and high repeatability and efficiency. The cost-effective integration of this system with customers' existing laser platform provides a rapid and highly attractive solution for university researchers, enabling economical and efficient expansion of PLD laboratory capabilities.

Key Features of the Blue Wave PLD System:

1. Multi-Target Deposition Capability: Supports up to six different 1-inch targets or three 2-inch targets, enabling multi-material thin film deposition without breaking vacuum.

2. High-Precision Target Carousel: Equipped with a rotatable target holder operating at 10 RPM using an external motor mounted on a magnetically coupled ultra-high vacuum (UHV) feedthrough. The system allows automated target indexing through a precision stepper motor for multilayer deposition.

3. Optimized Plasma Expansion Control: The substrate-to-target distance can be precisely adjusted to regulate deposition kinetics, film uniformity, and deposition rates, ensuring high-quality film growth.

4. High-Temperature Substrate Heating: Blue Wave Semiconductors substrate heater is capable of reaching substrate temperatures up to 850°C. The substrate can be mechanically clamped to prevent damage to its back side.

5. Precise Gas Flow Control: Integrated mass flow controllers (MFCs) enable accurate regulation of process gases, with oxygen (O_2) as the primary gas and optional additional MFCs available for controlled film stoichiometry.

6. Laser Compatibility and Optical Precision: Designed to support excimer and solid-state lasers with an adjustable optical mount for precise laser beam positioning and multiple lens options for beam shaping.

7. Automated and Manual Operation: The system's external power supply allows seamless manual operation via push-button controls or automated operation through an optional computerized interface, ensuring ease of use and reproducibility in deposition experiments.

The Blue Wave PLD System's ability to integrate with multiple deposition techniques, including sputtering, thermal evaporation, chemical vapor deposition (CVD), and e-beam deposition, and glovebox makes it a highly versatile tool for advanced research in thin-film coatings and multilayer device fabrication. This next-generation system sets a new benchmark for precision, efficiency, and adaptability in thin film deposition technology.

According to Dr. R.D. Vispute, who is the founder of Blue Wave Semiconductors, "Whether in the context of quantum centers or high-quality thin film deposition, the Pulsed Laser Deposition (PLD) System provides the precision and reliability essential for our research endeavors. Implementing a target carousel that facilitates multiple substrate operations and rotations has introduced new dimensions to our studies involving complex composite materials, resulting in significantly expedited outcomes that are both cost-effective and time-efficient. The ability of the PLD System to function effectively within a research and development laboratory setting represents a transformative advancement in the field of Physical Vapor Deposition (PVD)".

Prof. Di Zhang, Assistant Prof. at the University of Texas at Arlington, said, "Blue Wave Semiconductors Inc. provides high-quality turnkey PLD systems that are user-friendly and very

easy to operate. Dr. Vispute and his team are highly responsible for handling all customer service requests. If you are looking for a simplified and cost-effective PLD system to start growing films with good quality, this can be your first choice!”

About Blue Wave Semiconductors: Blue Wave Semiconductors is a pioneering company specializing in the development of advanced thin-film materials and cutting-edge technologies for next-generation applications, including quantum sensing (CVD Diamond Systems), electronics, and composite thin-film materials (Blue Wave Semi PVD and CVD Systems). The company is a graduate of bwtech@UMBC, a leading technology incubator affiliated with the University of Maryland, Baltimore County (UMBC). To learn more about the PLD system and Blue Wave Semiconductors’ innovative research, visit www.bluewavesemi.com.

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