DENTON VACUUM
Enabling Innovation

INFINITY LANS SOLUTION

TECHNICAL SPECIFICATION SHEET

The Infinity Laboratory Alloy & Nanolayer System (LANS) uses Denton's patented bias target sputtering technology for research and development of emerging dielectric, metallic, magnetic, superconducting and semiconducting thin film development. It enables unparalleled control of layer thickness, interface, alloy composition and materials flexibility.

BENEFITS INCLUDE:

- Wide range of process pressures
- Control of adatom energies
- Excellent uniformity and repeatability
- Low defect and low contamination
- Atomically engineered thin film interfaces and surfaces

FEATURES	BENEFITS
Bias target sputtering	Independent control of ion currents and energies, interface engineering
Low process pressure	Large mean free path Collimation Dense films
Electronic shuttering	Instantaneous start/stop, Repeatability
Compatible with front-end options	Easily scalable to meet throughput demands
Automation software	Enhanced process control

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SYSTEM OVERVIEW

The Denton Vacuum Infinity LANS offers biased target sputtering (BTS), a hybrid technology designed to enable the best qualities of ion beam sputtering (IBS) and conventional sputtering.

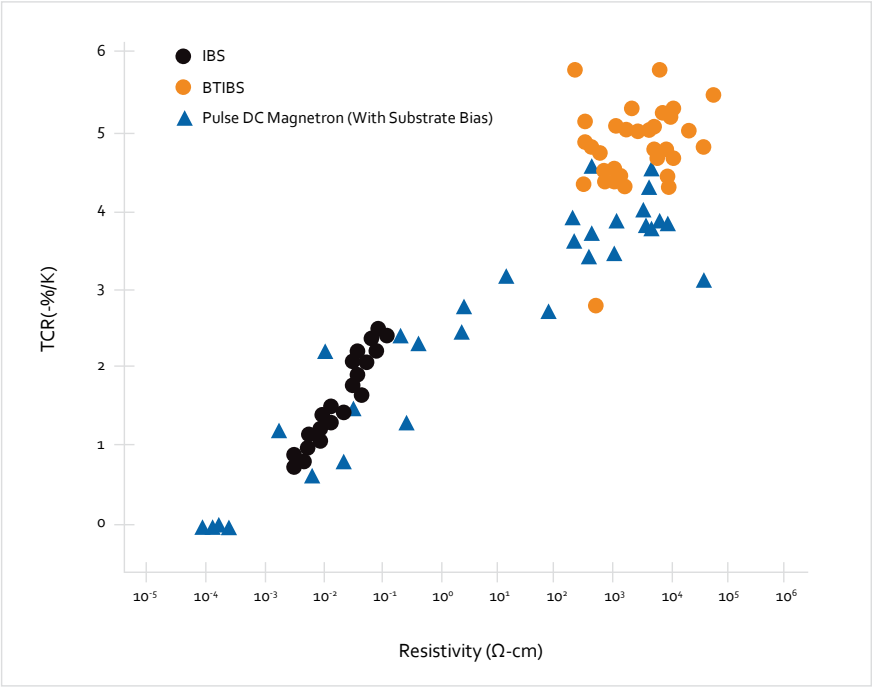
In BTS, a low energy ion source (typically of the end-Hall or closed-drift Hall type) is directed at a negatively biased sputtering target. The maximum energy (typically < 30 eV) of the ions is less than the sputter threshold of the vacuum system materials. No effort is made to capture all the ions on the target because ions that miss the target do not generate unwanted sputtering. In practice, the ion beam can be much broader than the target to improve illumination uniformity. A plasma sheath develops at the surface of the negatively biased target that accelerates positive ions entering the sheath toward the target to produce sputtering.

Because the sheath is very small (~2 mm) compared to the spacing between the ion source and target, the target bias has no substantial effect on the ion trajectories from source to target. Hence, for constant source operation, the illumination profile and the ion current reaching the target are nearly independent of the target voltage. A grounded shield surrounds the target to prevent undesired sputtering of the target mounting hardware that is also biased. DC, RF or pulsed DC target bias is used depending on the target material and desired process. A large range of target voltages (~100 to 2000 V) can be used while maintaining reasonable deposition rates. The selection of the target voltage, by virtue of its impact on adatom energies, has a profound impact on the atomic scale mixing at thin film interfaces and the overall roughness of the growing film. In addition, the ion source is capable of operating over a broad range of process pressures (~10-4 to 5x10-3 Torr), allowing control of the adatom scattering from the background gas.

A second, low energy ion source (an assist source) is directed at the substrate to modify the properties of the growing film. Non-reactive assisting ion energies of order 5-15 eV are useful in creating smooth films. Reactive assist ions can be used (e.g., ions of O_2 and N_2) to create dielectric films from metallic targets. This source can also be used to etch, clean and modify surfaces prior to deposition.

The platform offers a water cooled, rotating or pulsed DC biased stage, with substrate heating up to 600 ºC. This versatile platform is equipped with multiple processing targets for multilayer material synthesis and compositional nanotechnology. It is a perfect solution for the optics, magnetic sensor and R&D markets.

As with every Denton Vacuum system, the Infinity LANS will be configured to the exact requirements of your application, and you will have the support of our team of technical experts.



APPLICATIONS:

- Materials research & development
- Precision optics
- Magnetic sensors
- Semiconductor development
- Shape memory alloys
- Superconducting materials

CONFIGURATION OPTIONS

MODULE	Magnetically Biased Substrate	Heating to 600 ºC	Load Lock

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