ASI vs. SCI Cylindrical Magnetron Comparison

Angstrom Sciences, Inc.
www.angstromsciences.com

Overview:

Selecting a cylindrical magnetron is a daunting task for a system OEM, in-house system designer or as an upgrade to an existing system.

Process requirements, production economics, maintenance costs, and risk management are all factors that must be considered in this complex decision.

It is very easy to become confused by the sheer volume of information that is currently circulating in the marketplace and knowing which details may be important as well as those that may require further clarification.

This brief tutorial outlines the advantages of our field-proven technology and our hope is that it will focus you on the “real issues” that must be considered in selecting both a technology and a partner for cylindrical magnetron sputtering.

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Magnet Encapsulation:

ASI: ASI uses a proprietary method to completely seal the powerful, yet corrosion-prone FeNdB magnets in a welded, stainless steel enclosure that is impervious to water. After welding, the entire assembly is back-filled with a protective epoxy to add a second layer of protection. This approach guarantees virtually unlimited magnet bar life.

SCI: SCI may provide magnetics which are not encapsulated, generally have a finite lifetime of typically one to two years and, the quality of magnets may be susceptible to change with slight mechanical impact. In addition to the expense and downtime associated with magnet bar replacement, localized corrosion of the magnets WILL induce process drifts associated with the uneven loss of magnetic field strength (rust is not magnetic!) along the length of the magnet bar.

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Deposition Efficiency

ASI: ASI's patented profiled magnet technology generates an intrinsically narrower deposition flux profile which results in the maximum amount of material winding up on the substrate. Depending on the system geometry almost 20 % more material that is sputtered from a given tube is available for incorporation in the product; resulting in lower production costs and higher system uptime . ASI's turn-around design guarantees 85% + target material utilization on target thicknesses up to 25mm (without resorting to a "dog bone" configuration), there is simply no stronger economic argument that can be made.

SCI: SCI's magnetics are based on first-generation (non-profiled) bar magnets that produce an excessively wide deposition profile that is prone to coating internal shielding and wasting valuable target material. This type of magnetic design may also be highly unbalanced causing additional substrate heating due to ion bombardment. SCI also guarantees 80% materials utilization, a value that is rarely, if ever, obtained and even then only at a target thickness of 10 mm. The guaranteed utilization drops off rapidly as the target thickness increases. Further, it is recommended to "tilt" the magnet array in towards the center which might help in reducing shielding debris, but promotes cross-contamination of adjacent target tubes when used in a dual configuration.

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Target Overhang:

ASI: ASI guarantees the ability to produce +/- 2% thickness homogeneity with a 125 mm (either side) target overhang of the active coating zone at typical (50 to 75 mm) target to substrate distances.

SCI: SCI makes very aggressive claims about minimal overhang with uniformity capability of better than 1%, but analysis of their published deposition models indicates that they require a minimum overhang of 250 mm per side to achieve comparable values to ASI. By simple arithmetic, the effective uniform coating length is less than 150 mm on a stated target length of 650 mm!

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Thickness “Tuneability”:

ASI: ASI’s modular magnet bars and adjustable shunt technology permits users to “dial out” pumping and chamber “bias” in the thickness distribution of the sputtered coatings. Thickness homogeneity approaching +/- 1% has been demonstrated on target tubes up to 3.7 m in length.

SCI: SCI’s one piece magnet bar makes tuning “out” localized non-uniformities by magnetic adjustment virtually impossible.

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Process Stability:

ASI: ASI's profiled magnet bar technology results in higher fields at the target surface which have the dual benefit of modifying the properties of transparent conductive oxide coatings and allowing the magnetron to operate reliably at lower process pressures (often a requirement for the highest quality coatings).

SCI: SCI's first-generation, bar magnet technology generates lower fields at the target surface and requires operation at much higher process pressures.

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Manufacturing Utility:

Target Tubes: ASI's current generation of cylindrical magnetrons utilize industry standard "metric" tubing which all major target manufacturers use.

Power Handling: ASI's field maintainable end block design handles power in excess of the power limits that all commercially available targets can withstand.

Flexibility: ASI's broad product range in both "drop in" and "cantilever style cylindrical magnetrons accommodate all current and anticipated future system requirements.

Advantage: Angstrom Sciences

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Summary:

In the end, when the factors that really matter are considered, the clear choice for cylindrical magnetron sputtering technology is Angstrom Sciences. Please visit our website **www.angstromsciences.com**, call us directly at **(412) 469-8466**, or email us at **info@angstromsciences.com** for more information.

Advantage: "You" the customer!

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