QA00-00011: Angstrom Engineering's Aluminum Source

Instructions for optimal use and product longevity

This source is ideal for thermal deposition of aluminum (Al). Aluminum presents several challenges for deposition which this custom source aims to solve. Aluminum tends to wick and spread across the surface of a boat as it deposits. It can quickly reach the copper posts of the source and cause a short. When the boat is made from refractory metals it alloys to form brittle compounds that crack easily. It is common to see metal boats break after 1-3 depositions. Aluminum also has a high coefficient of thermal expansion which exerts stress on boats when it melts and solidifies. This can cause the surface of other coated boats to rapidly degrade. This source is constructed with a graphite core and tough ceramic coating. When following the recommendations on this sheet this source is expected to last up to one hundred depositions or up to 6 months of regular use.

Over time, aluminum *will* build up near the ends of this source. To counteract this, we recommend the following:

1. The graphite core must be clamped to the resistive source without touching the ceramic coating. It is possible to carefully trim the ceramic with a sharp knife if the clamp spacing is too short in your specific chamber geometry.
2. Run the source to dry/empty of material after approximately every 6th to 10th use. This should be performed at a normal to slightly higher than normal deposition power. On our current tools this source deposits material at approximately 55-60% power with our 10 volt/2.5 kW transformer. A maximum power of 70% is suggested for this source.
3. We recommend only loading this source with 1/8" diameter pellets (Angstrom part number QA04-00100), and that the maximum charge is 6 pellets. This is typically enough material for 100 nm or more of aluminum for a cathode layer, even in our larger chambers.
4. Once this source is mounted and clamped in a resistive source location, it should not be moved, as the stress of clamping/unclamping after use can sometimes cause the graphite core to break.

Note that this source requires a higher voltage than some transformers are capable of providing. On some of our older tools we used dual tap transformers that were configurable to a higher voltage/lower amperage setting. These transformers are typically capable of up to 8 volts of output, which is sufficient to melt and deposit aluminum. The source will not melt aluminum from a transformer capable of only 4 volts.

On our newest tools we have specifically designed clamps to accommodate the thickness of this source. The clamps have set screws in the back corners to allow the clamp to sit level with the top of the source. We may be able to provide clamps that have the same feature for your existing tool, though these are for convenience and not a requirement.

Questions or concerns? Talk to us. We're here to help. materials@angstromengineering.com