



Science and Technology of Materials, Interfaces, and Processing Southern California Chapter

Fall 2019

Quarterly Newsletter

Special points of interest:

- Workshop on Helium Leak Detection sponsored by Leybold
- R.D. Mathis shares Evaporation Tips
- SCCAVS Exhibition and Short Course Program

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FREE Workshop on Helium Leak Detection

Contributed By Tom Anderson

The Southern California Chapter of the American Vacuum Society is holding an annual Equipment Exhibition and Short Course Program at the Holiday Inn Buena Park on Tuesday, October 1, 2019.

Leybold USA will be offering a **FREE Helium Leak Testing Tutorial**. This tutorial will cover the basics of helium leak detection and techniques for optimal leak detection for different applications.

Leybold's latest Phoenix 4.0 leak detector will be used for some hands-on training.

This innovative product is equally suited to the demands of research and development as for those of industrial applications - from securing the ultra-high vacuum demands in CERN's particle accelerator, to industrial applications such as leak detection in the Hyperloop vacuum transport system or for semiconductor production.



Leybold is the world's original vacuum company, founded by Ernest Leybold in 1850. Leybold has pioneered many of the technologies used in vacuum applications today, such as turbo pumps and diffusion pumps.

Our speaker is Chris McCarthy, Sales Manager for Scientific Vacuum for Leybold USA. Chris has both a Bachelor of Science degree and Master of Science degree in Mechanical Engineering from the University of Illinois in Urbana.

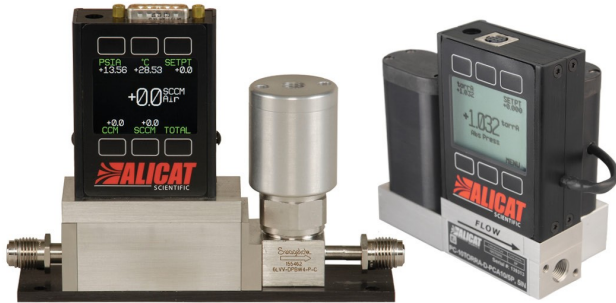
Prior to joining Leybold in 2007, Chris was a Sales Manager at Pfeiffer Vacuum for 7 years. and was responsible for the sale of helium leak detection systems. Chris has also worked for BP, Amoco Oil, Motorola and General Motors, in various research, engineering and sales positions, and also as Refinery Laboratory Manager.

(cont'd on page 2)



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Leak Detection Workshop (cont'd)



Chris McCarthy, Leybold USA

The Workshop will be held from 10AM to 12PM October 1,
2019 in the Marquis II room. Attendance is FREE and pre-
registration is not required.

For more information visit:

<https://www.sccavs.org/symposium2019.html>

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We're on the web!
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Upcoming Events

SCCAVS Equipment
Exhibition & Short
Course Program
Holiday Inn
Buena Park, CA
Sept 30-Oct 2, 2019



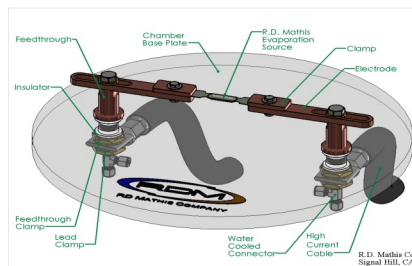
AVS 66
Greater Columbus
Conference Center
Columbus, OH
Oct 20-25, 2019



Special Advertorial Section Sponsored By R.D. Mathis

Choosing the right source for your evaporation process

The right source for your Thermal Evaporation process will depend on many factors. We offer a wide selection of evaporation sources through our catalog and website, as well as custom fabrication to meet your specific need. Most sources are available in tungsten, tantalum and molybdenum, and many are available with an alumina coating applied to the top surface to minimize migration and corrosion of materials. Standard Product information and technical information and publications are available on our website at www.rdmathis.com. The diagram below illustrates the typical layout of a thermal evaporation system within a vacuum chamber.



Factors to consider when choosing a source:

- A) What is minimum & maximum length of source that will fit in to your mounting scheme?
- B) What is the throw distance? (source to substrate)
- C) What material will you be evaporating?
- D) Which source material is compatible with your evaporant? (see our [Source Reference Guide](#))
- E) What temperature will you be reaching?
- F) How much power do you have to heat the source (amperage)?
- G) What capacity will you need to achieve your desired thickness?
- H) Are you evaporating in an upward, downward or sideways direction?

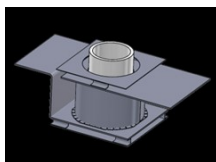
These are some of the factors that will help determine the right source for your needs. After determining the answers to the above factors, please give us a call if you need further assistance. Below is a compilation of evaporation tips that you may find useful if you are attempting to evaporate any of the following materials for the first time.

Aluminum Evaporation

Aluminum is a very popular material for evaporation. We have many different sources that can be used to successfully evaporate aluminum. However, there are a few common problems that occur when evaporating this material. One problem is that aluminum wets to most surfaces and does not stay in the evaporation area. We call this migration. The other, more significant problem is that molten aluminum is very corrosive and will corrode through most surfaces and cause the boat or box to break during the evaporation process. Spitting is not normally a problem. Tungsten is the most resilient of the materials to this corrosiveness.

For small amounts of aluminum you can use a filament, basket or rod source. For larger amounts you may want to consider a boat, box or crucible with crucible heater.

Also, consider our new **"Cool Lip Crucibles"** (see below) which do a great job of controlling the wetting of the aluminum and minimize any migration of the aluminum out of the crucible. We offer these in 1/2" and 1" diameters to fit most of our crucible heaters.



(Continued on page 4)



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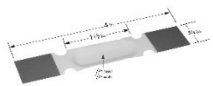
Evaporation Tips (Continued from page 3)

Gold Evaporation

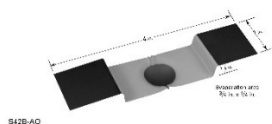
Gold can be successfully evaporated by a variety of methods. Boats, Baskets, crucibles, and filaments are the most common types of sources used. However, gold, when molten, has 2 issues:

- 1) It is corrosive and will corrode through the boat eventually, and
- 2) Gold will try to migrate to cooler areas of the boat (where it is mounted). Our alumina coated boats are ideal to solve these problems. For example, with the S21-AO-W, the entire dimple area is coated with alumina.

S21-AO-W



S42B-AO-W (barrier style coating)



This prevents the gold from wetting to the tungsten thus eliminating migration and corrosion. However this boat takes about 30% more power than an uncoated boat due to the alumina coating. On the other hand, our S42B-AO-W barrier style boat solves the migration issue by letting the gold wet to the dimple area, but the AO coating prevents the gold from leaving the dimple area. The .010" thick tungsten is thick enough to withstand the corrosiveness for a few runs. We also offer high purity gold pellets, wire and sputtering targets in a variety of sizes and quantities.

Nickel Evaporation

Nickel has two characteristics that occur during thermal evaporation that can complicate the deposition process. These difficulties are 1) Ni is very corrosive when molten and will eat through (alloy with) most materials and 2) Ni is very aggressive and will migrate out of the evaporation area. The good news is that there are a few ways to manage these difficulties that can result in a successful and repeatable evaporation process. For small amounts of Ni evaporation, you can consider using a tungsten basket made from stranded tungsten wire. These baskets are inexpensive, easy to use and only require low power (20-30 amps). The downside of these baskets is that they will have a limited lifetime. Another good choice would be to use our "alumina..."

(Continued on page 6)

NOT YOUR ORDINARY SCREW

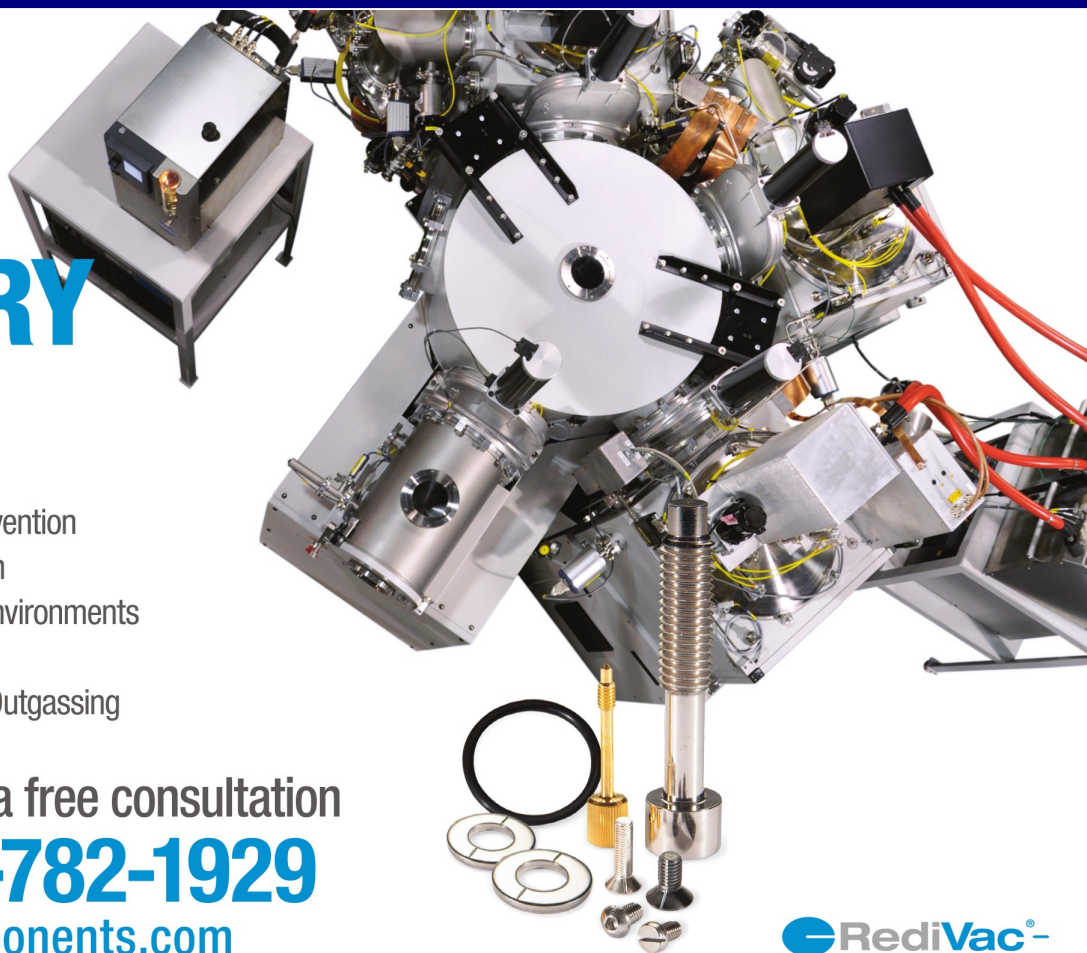
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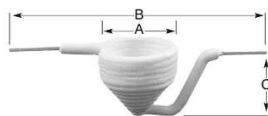
uccomponents.com



Evaporation tips (continued from page 5)

coated tungsten baskets". These operate at the same low power levels, have a longer lifetime and help to control the behavior of the Ni. These parts were designed for the evaporation of Ni. This would be our first recommendation.

Alumina Coated Tungsten Baskets



Part Number	Wire Dia.	"A" Top I.D.	Inside Depth	"B" OAL	"C" Height	Volts	Amps	Watts	Temp
RDM-WBAO-1	.020"	.150"	.225"	4"	.375"	5.7	11	63	1475°C
RDM-WBAO-2	.040"	.375"	.350"	4"	.500"	6.2	40	248	1475°C
RDM-WBAO-3	.040"	.420"	.425"	4"	.575"	6.9	39	272	1475°C
RDM-WBAO-4	.040"	.790"	.725"	4"	.875"	13	33	429	1475°C
RDM-WBAO-5	.050"	.500"	.775"	4"	.925"	7	50	350	1475°C
RDM-WBAO-6	.060"	.900"	.975"	4"	1.125"	15.8	49	768	1475°C

Dash Numbers are in order of size (height)

These parts can be found on our website by clicking on "Products," "Evaporation Sources," and then select "Alumina Coated Sources." They are the first item listed in this section. If you have question about the use of these parts or the best evaporation technique for your specific material, please send us an email at info@rdmathis.com or give us a call at (562) 426-7049.



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VON ARDENNE

September/October 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30 Short Courses	1	2 Short Courses	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26



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