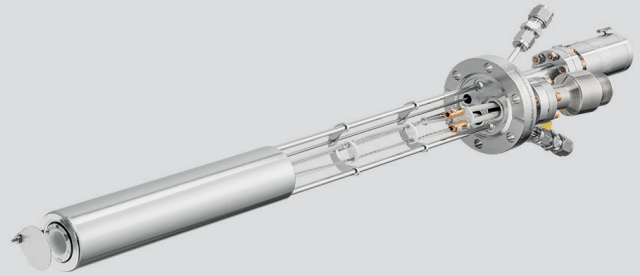
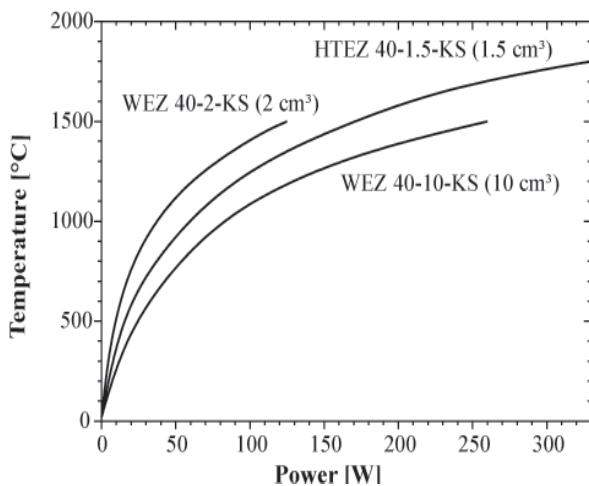


COMPACT EFFUSION CELLS WEZ / NTEZ / HTEZ

- Compact and robust cell design
- Integrated cooling shroud and shutter
- Clean operation in UHV systems
- Excellent temperature and flux stability
- Low power consumption
- Optimized low temperature cells



Compact effusion cell on DN40CF (O.D. 2.75") flange with a 10 cm³ PBN crucible, integrated cooling shroud and shutter



Effusion cells of the Knudsen type are generally used to evaporate or sublimate a great variety of materials. The evaporant in the crucible is heated by tantalum or tungsten wire filaments, while the heater is shielded by multiple layers of tantalum foil. Only high quality refractory metals like W and Ta are used in the hot area to ensure high purity operation and low outgassing at high temperatures.

An excellent operation temperature stability of ± 0.1 K and therefore very stable flux rates are achieved by PID control of the operating temperature. The standard crucible material is PBN (pyrolytic boron nitride) - a very clean and chemically inert ceramic material. Other crucible materials such as Al₂O₃, BeO, tungsten, pyrolytic graphite (PG) or quartz are available as required.

The compact cell design with integrated water cooling and shutter on a DN40CF (O.D. 2.75") mounting flange is ideally suited for small research surface analysis systems. Its effective water cooling minimizes the heat load by thermal radiation and thus protects both vacuum chamber and port tubes.

For evaporation of high vapor pressure materials and organic molecules the low temperature effusion cell NTEZ is recommended. Standard effusion cells WEZ are suitable for most materials evaporated at temperatures from 700 to 1400°C. For applications at higher temperatures the high temperature effusion cell HTEZ with a free-standing tungsten filament can be used.

WEZ and NTEZ cells are provided with standard, hot lip, cold lip or dual filament, to cover different evaporation material requirements.

Material	M. P. *	T op.**	Source Type	Filament
Zn	419 °C	250 °C	NTEZ	HL
Mg	649 °C	327 °C	NTEZ	SF
Ca	842 °C	459 °C	NTEZ	HL
In	157 °C	742 °C	WEZ	HL
Ag	961 °C	832 °C	WEZ	SF
Ga	30 °C	907 °C	WEZ	HL
Al	660 °C	972 °C	WEZ	CL
Cu	1084 °C	1027 °C	WEZ / HTEZ	HL
Au	1063 °C	1132 °C	WEZ / HTEZ	SF
Ge	937 °C	1167 °C	WEZ / HTEZ	SF
Fe	1535 °C	1180 °C	WEZ / HTEZ	SF

* Melting point

** Typical operating temperatures required for growth rates in the range of 0.1 to 0.5 ML/s (about 1-3 nm/min) using a WEZ 40-10-22-KS at a source to sample distance of 100mm

Applications

Compact effusion cells in combination with DC power supplies and PID temperature controllers are an economically priced solution for thin film deposition in surface analysis systems or small sample preparation chambers.

The concept of a radiation-heated crucible is applicable to the majority of materials and is especially suited for materials that are typically evaporated at temperatures above their respective melting point. Specialized compact effusion cells are provided for high as well as for low vapor pressure materials. Some typical operating temperatures of various materials are listed in the table overleaf. Due to the compact design even the high temperature cells need minimum power:

The simple and robust cell design allows changing of the evaporation material by a simple crucible exchange procedure. Large crucible capacities guarantee long operation periods without refilling or service. Precise temperature measurement and control enable very stable and reproducible growth rates in an extremely wide range from below 0.01 nm/h (e.g. doping applications) up to several nm/s for thin film growth. A temperature variation of typically 100°C changes the flux about one order of magnitude. By using thermal evaporation ionization processes, that could lead to ion-induced damages of the sample, are avoided.

Technical Data

Mounting flange	DN40CF (O.D. 2.75")
Dimensions in vacuum	190-400 mm / Ø 34 mm for NTEZ / WEZ 40-2-16-KS; 210-400 mm / Ø 36 mm for NTEZ / WEZ 40-10-22-KS; HTEZ 40-1-20-KS
Filament type	Ta wire filament: standard (SF), hot lip (HL), cold lip (CL), dual (DF) for NTEZ / WEZ; free standing tungsten heater for HTEZ
Thermocouple	W5%Re/W26%Re (type C) or NiCr/NiAl (type K)
Bakeout temperature	max. 250°C
Operating temperature	80-1000°C (NTEZ); 700-1400°C (WEZ); 800-1700°C (HTEZ)
Outgassing temperature	max. 800°C/1100°C (NTEZ); max. 1500°C (WEZ); max. 1900°C (HTEZ)
Cooling	integrated water cooling shroud (K)
Shutter	integrated rotary shutter (S) with Ta shutter plate
Crucibles	1.5 cm ³ (PBN, Al ₂ O ₃ , BeO, PG, Ta, W) for HTEZ 2 cm ³ or 10 cm ³ (PBN, Al ₂ O ₃ , PG, quartz) for WEZ / NTEZ

