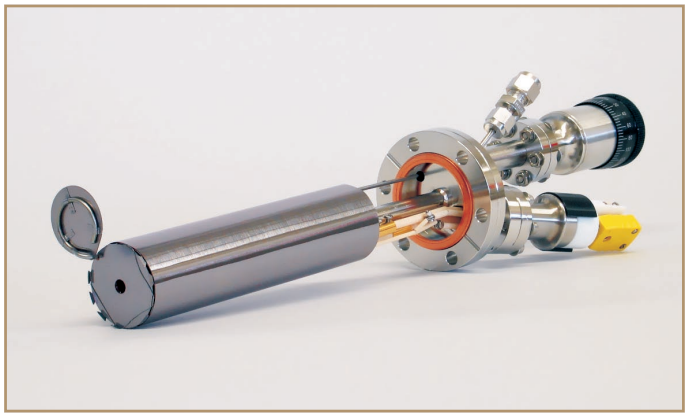
ORGANIC MATERIAL EFFUSION CELL OME



OME40-Q2-S on DN40 CF (O.D. 2.75") flange with 2cm^3 quartz crucible and integrated shutter

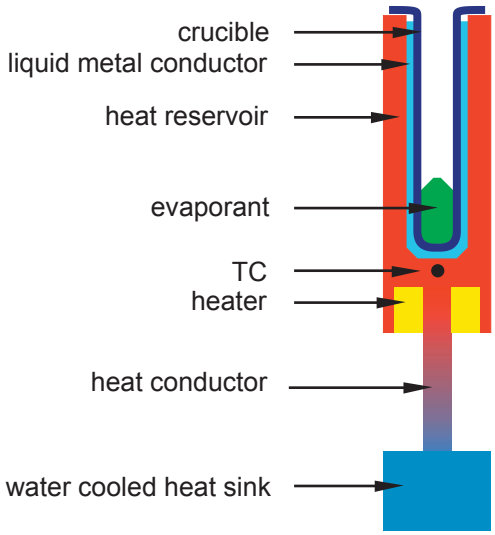
- **Patented design**
- **NEW Thermal Conduction Cooling**
- **Fast and precise temperature control**
- **UHV and MBE compatibility**
- **Ideal for evaporation of organic materials and OLED application**
- **Temperature range 15 - 350°C,**
- **optional below room temperature**

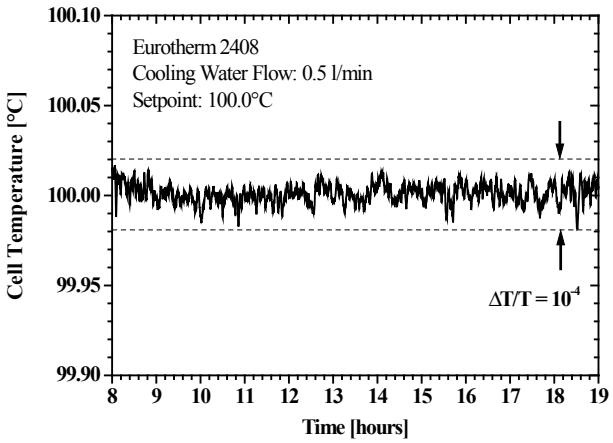
The Organic Material Effusion Cell -OME- is one of the latest effusion cells designed by the Dr. Eberl MBE-Komponenten GmbH.

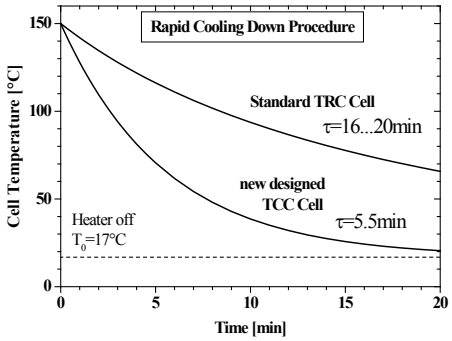
Due to the new patented Thermal Conduction Cooling technique (TCC) the OME cell provides drastically improved operation conditions for low temperature evaporation of organic materials.
Conventional effusion cells with Thermal Radiation Cooling (TRC) show a poor cooling efficiency at low operation temperatures, due to the T^4-dependency of the emitted radiation power according to the Stefan-Boltzmann-Law. This results in a low cell cooling rate making precise temperature control below 150°C very difficult.

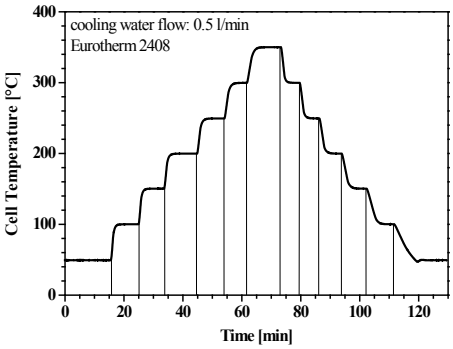
Our new OME cell uses the linearity of the heat transfer between a heated reservoir and a cooled heat sink to obtain a high cooling rate even at very low operation temperatures. The new concept involves a liquid metal used as a thermal conductor that provides direct thermal connection between crucible and heat reservoir without isolating voids. This excellent thermal contact also guarantees a very uniform temperature distribution within the crucible. Precise temperature measurement provided by a direct touching TC is a further advantage of the innovative OME cell design.

The diagram on the right shows the excellent long term temperature stability of the OME cell. The stability during a periode of 10h operation with PID controller is better than +/- 0.02 K.









The cooling rate of the TRC cell is increasing with cell temperature according to Stefan-Boltzmann-Law while the cooling rate of the TCC cell is increasing linearly with temperature. Despite its larger thermal mass the cooling rate of the TCC cell is much higher at low temperatures and reaches 10°C/min even at 70°C cell temperature. TCC cell and TRC cell during cooling down procedure are compared in the second diagram, on the left. It shows the resulting temperature decrease of both cells starting at the same cell temperature of 150°C. After switching off the cell heaters the TCC cell cools down about 4 times faster than a comparable low temperature TRC cell.

The fast heating up and cooling down times are shown on the third figure. It is also remarkable, that no temperature overshoot is found in the heating up steps.

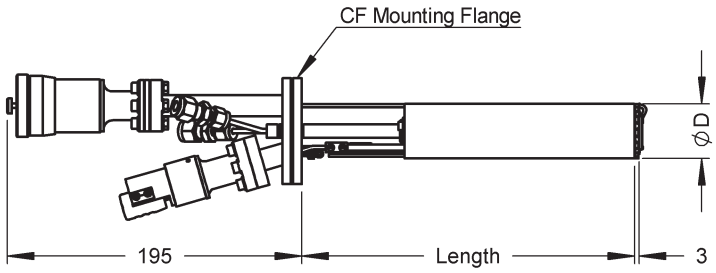
The excellent low temperature properties of the TCC concept make the OME cell ideally suited for evaporation of temperature sensitive materials like organics or polymers. In standard radiation-heated low temperature cells the evaporant may be locally overheated due to the direct view of the crucible onto the heater wires. In contrast the crucible of the OME cell never reaches temperatures higher than the actual temperature of the heat reservoir. Rapid heating up and cooling down rates avoid waste of expensive materials during non-operation times.

Technical Data OME

Mounting flange	DN40 CF (O.D. 2.75”) or larger
Dimensions in vacuum	**Length:** 220-400 mm (user specific); **ØD:** 36 mm
Heating system	encapsulated Ta wire heater (max. 250 W); patented TCC technique
Temperature sensor	thermocouple NiCr/NiAl (type K); others on request
Bakeout temperature	max. 250°C
Operating temperature / stability	15°C[1)] - 350°C[2)] ; < ±0.02K
Cooling	integrated water cooled heat sink; water flow >0.5 l/min required
Crucibles	2-35 cm^3; quartz (Q); other materials and sizes on request
Shutter	integrated rotary shutter (S); tight sealing shutter on request (TS)

1): lowest operation temperature depends on cooling media temperature
2): 300°C is recommended long-term maximum temperature

Schematic drawing of the
Organic Material Effusion Cell
(Drawing shows OME 40-Q2-S)



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