

## Dual filament source - ABN DF

- More than 11,000 effusion cells in operation worldwide
- Accentuate hot or cold lip effect
- Provides a pure, stable and reproducible beam flux
- Uniformities better than  $\pm 1\%$
- Rugged and reliable design
- Very large range of capacities



### Product introduction

Dual filament cells are the workhorse for any MBE systems, enabling to evaporate a large range of materials.

The dual filament configuration allow the temperature gradient over the length of the crucible to be varied in order to accentuate either a "hot lip" or "cold lip" type behavior. It prevents condensation at the crucible mouth by heating this zone to a higher temperature.

Eliminating droplets at the cell orifice significantly reduces morphological defect densities (e.g. oval defects) while improving the beam flux stability.

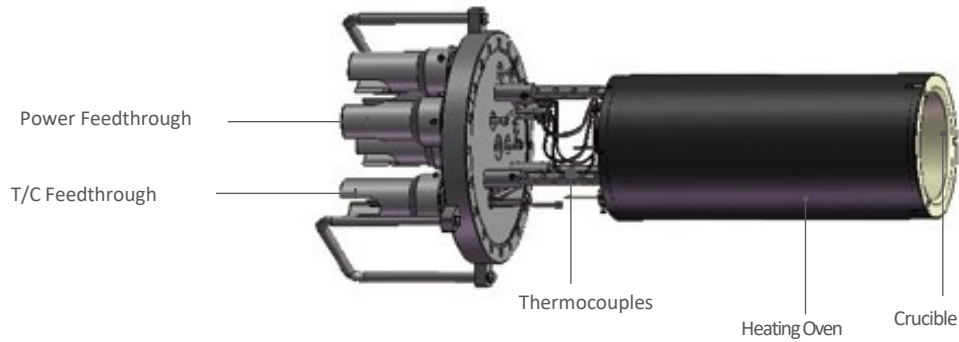
It is highly recommended to use two separate power supply and PID control racks to take maximum advantage of the double filament configuration.

Most of dual filament cells exist in two versions, either equipped with C-type or K-type thermocouples, in order to adapt the temperature control range, depending on the material to evaporate.

Ranging from 35cc for small MBE systems, up to 3700 cc for production machines, Riber ABN DF dual filament series equipped most of MBE systems in the world



## Layout



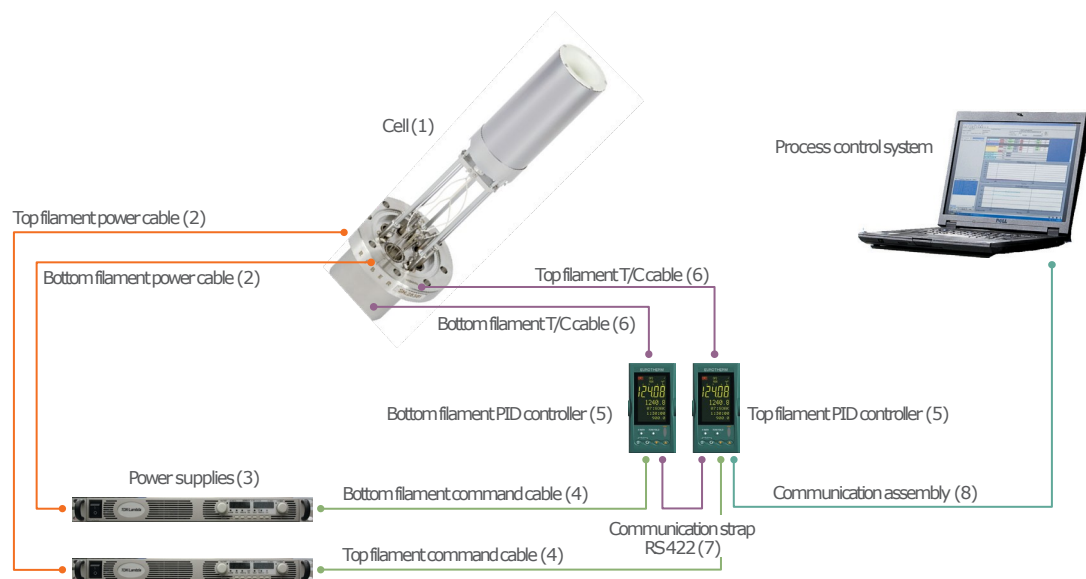
## Specifications

Cell characteristics	ABN 135 DF	ABN 60/80 DF	ABN 150 DF	ABN 300 DF	ABN 600/700 DF	ABN 1700 DF	ABN 3700 DF
Source capacity	35 cc	60/80 cc	150 cc	300 cc	600/700 cc	1700 cc	3700 cc
Mounting flange	CF35	CF63	CF100	CF125	CF150	CF200	CF250
Temperature stability	± 0,2°C						
Crucible shape	Conical						
Crucible material	PBN						
Filament type	Dual Tantalum filament – independently controllable						
Thermocouple type*	Two C type						
Typical operating temperature	750 – 1200°C						
Maximum outgassing temperature	Bottom filament 1400 °C / Top filament 1300°C						
Power required for maximum temperature** (top + bottom filaments simultaneously)	400 W	770 W	1315 W	1900 W	3460 W	6000 W	9540 W
Power supply	Two power supplies / Two temperature controllers						

\*Please consult Riber for K type thermocouples

\*\*For some versions and systems adaptations, integrated water cooling can be available

## Component interfacing



## Results

### ABN series provides outstanding uniformities

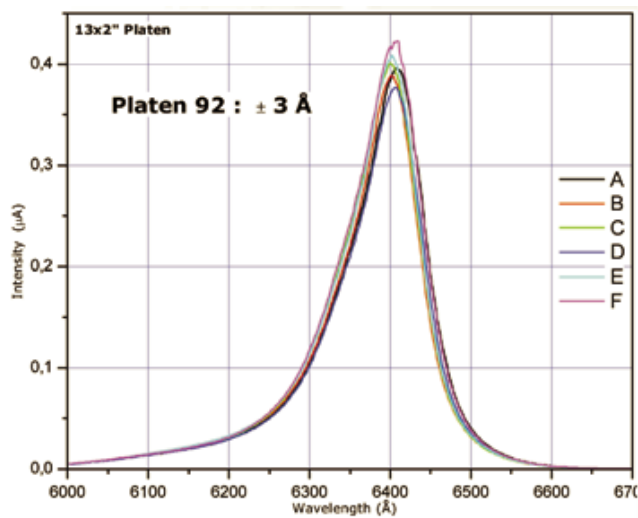
Results obtained on MBE49 Production System

Growth and structure characterization were performed by the Ribier Application Laboratory, using the Ribier MBE49 system, with S150 DZ 700 effusion cells (Ga, Al, In) and the KPC1200 phosphorus valved cracker cell.

The AlGaInP/InGaP multi-quantum wells were grown on 2", GaAs(Si) substrates.

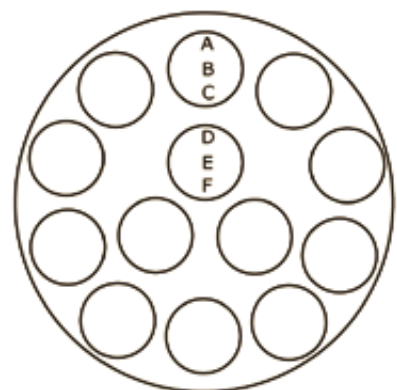
Based on photoluminescence measurements over the entire 13x2" platen, the structure demonstrates an excellent wavelength uniformity:

$\Delta\lambda = \pm 0.06\%$ , showing that S150 DZ 700 effusion cells exhibit excellent uniformity fluxes over the entire platen.



Platen position	Wavelength (Å)
15	6404
32,5	6402
47	6402
70	6408
88	6402
102	6406

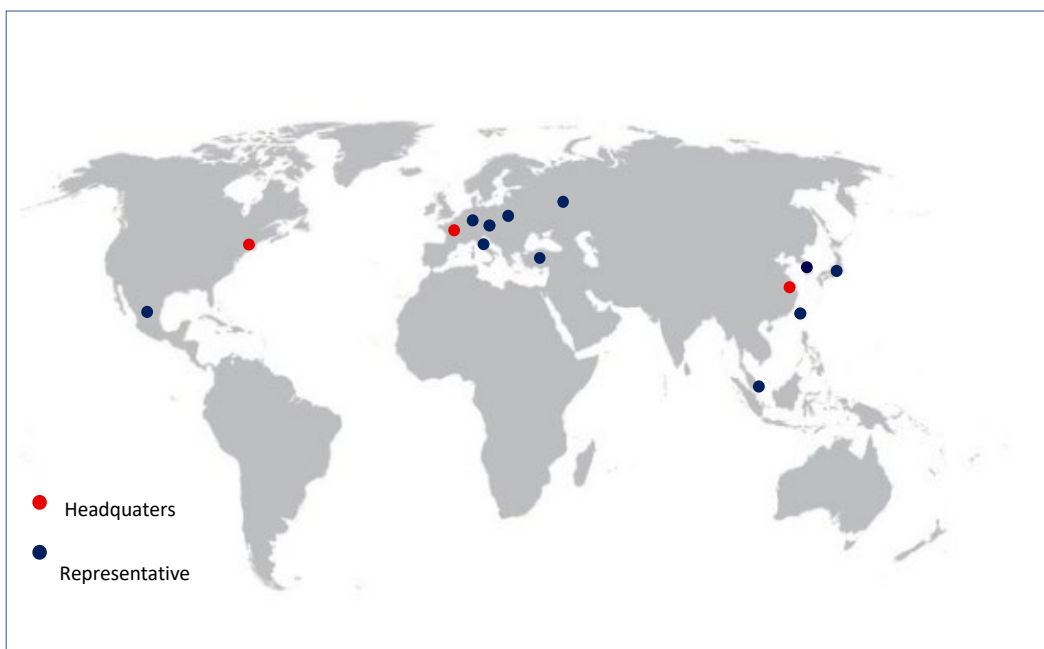
Ga <sub>0.515</sub> In <sub>0.485</sub> P	
(Al <sub>0.7</sub> Ga <sub>0.3</sub> ) <sub>0.515</sub> In <sub>0.485</sub> P	Q.0.7
Q.0.5 → Q.0.7 gradual layer	
AlGaInP	Q.0.5
AlGaInP	Barrier
GaInP	Strained QW
AlGaInP	Barrier
GaInP	Strained QW
AlGaInP	Barrier
GaInP	Strained QW
AlGaInP	Barrier
GaInP	Strained QW
AlGaInP	Q.0.5
Q.0.7 → Q.0.5 gradual layer	
(Al <sub>0.7</sub> Ga <sub>0.3</sub> ) <sub>0.515</sub> In <sub>0.485</sub> P	Q.0.7
GaAs	
GaAs(Si)	



13x2 platen

## RIBER SALES AND SERVICE NETWORK

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