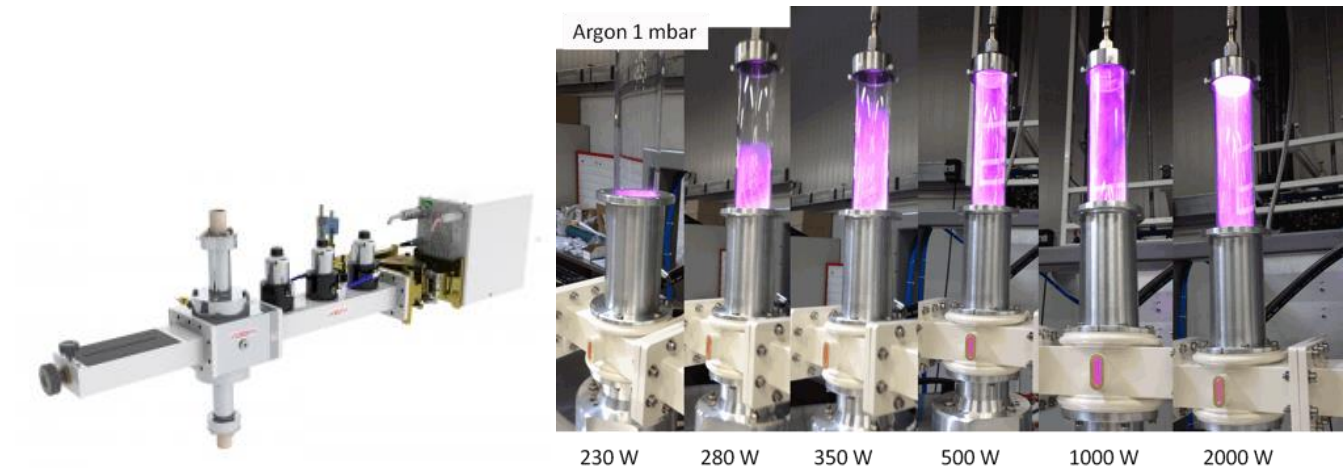




Microwave plasma sources

Downstream plasma source – 2.45 GHz



Downstream source – 2.45 GHz WR340, Argon at 1 mbar and at different microwave power levels

The surface wave type of plasma source generates plasma in a dielectric material tube (diameter 20-60 mm) placed in a standard WR340 waveguide. This plasma source enables the ignition and sustaining of long plasma columns depending on the pressure, the microwave power and the nature of the 'plasma' gas

Technical specifications

PRESSURE RANGE A few 10⁻² mbar up to atmospheric pressure

GAS TYPE Ar, N₂, O₂, air, ...

MAXIMUM POWER 6 kW

APPLICATIONS TYPE Creation of radicals / reactive species, surface activation, PECVD, gas abatement, gasification, sterilization (UV), nanopowder synthesis

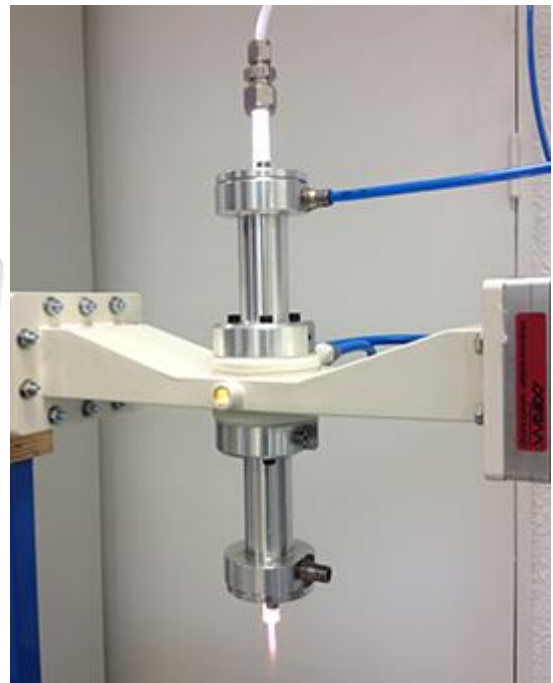


Surfaguide plasma source – 2.45 GHz

Surfaguide plasma source generates plasma in a dielectric tube via a surface wave. The main feature of the Surfaguide is the reduced height of the standard waveguide to locally intensify the microwave electric field and consequently, help with the ignition and sustaining the plasma. This source is principally suited for operation in the range of a few mbar up to atmospheric pressure.

Technical specifications

- **PRESSURE RANGE**
A few 10⁻² mbar up to atmospheric pressure
- **GAS TYPE**
Ar, N₂, O₂, air, ...
- **MAXIMUM POWER**
6 kW
- **APPLICATIONS TYPE**
Creation of radicals / reactive species, surface activation, PECVD, gas abatement, gasification, sterilization (UV), nanopowder synthesis



Watercooled surfaguide WR340

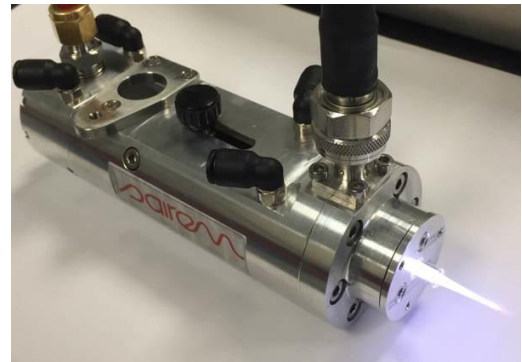


S-Wave plasma source – 2.45 GHz

The S-wave is a plasma reactor used for microwave propagation and designed to launch a surface electromagnetic wave. The S-wave is an effective plasma source for the production of reactive / excited species using a 6 mm or 8 mm diameter dielectric tubes. When used for measurements and analysis, to avoid spurious spectral lines due to the mains 50/60 Hz we recommend using Sairem low ripple solid state microwave generator GMS 200 W.

Technical specifications

- **PRESSURE RANGE**
A few 10^{-2} mbar up to a few bars
- **GAS TYPE**
Argon or argon based gas mixture at atmospheric pressure. All gases at reduced pressure.
- **MAXIMUM POWER**
300 W
- **APPLICATIONS TYPE**
Creation of radicals / reactive species, surface activation, elementary analysis



S-Wave for power up to 200 W represented with an argon plasma at atmospheric pressure – 2.45 GHz



Aura-Wave ECR Coaxial plasma source – 2.45 GHz



Oxygen, 7×10^{-3} mbar, 190 W



Argon, $2,5 \times 10^{-3}$ mbar, 1 W

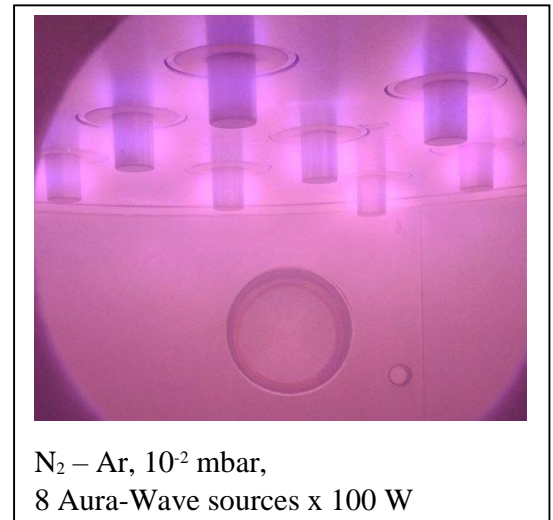
Aura-Wave has been designed to be self-adapted once the plasma ignited. A magnetic field combined to the electromagnetic wave allows the creation of plasma at low pressure – range of 10^{-3} mbar.

Technical specifications

PRESSURE RANGE A few 10^{-4} mbar up to 10^{-1} mbar

GAS TYPE Ar, N₂, O₂, CH₄, He, air, ...

MAXIMUM POWER 200 W



N₂ – Ar, 10^{-2} mbar,
8 Aura-Wave sources x 100 W

APPLICATIONS TYPE Large volume treatment, PECVD, etching, surface treatment (nitration, cleaning...), sterilization (reactive species / UV / ionic bombardment)

Combined with Sairem solid-state microwave generator, this source can maintain plasmas at power levels starting with 1 W. For small mismatches due to operating condition limitations, it is always possible to vary the frequency of the solid state generator to match the impedance.

In multi-source set up, and thanks to SAIREM solid state microwave modules, Aura-Wave is ideal for the production of large volumes of plasma [1-4] at operating pressures between 10^{-3} mbar and 10^{-1} mbar, allowing to obtain plasma density up to a few 10^{11} cm⁻³ in different gases.



Hi-Wave collisional plasma source – 2.45 GHz

The Hi-Wave microwave collisional plasma source has been designed to sustain over-dense microwave plasma from 10^{-2} mbar to a few 10^{-1} mbar and from a few watt whatever the gas.

Technical specifications

PRESSURE RANGE 10^{-2} mbar up to a few 10^{-1} mbar

GAS TYPE Ar, O₂, N₂, air, H₂, CH₄...

MAXIMUM POWER 300 W

APPLICATIONS TYPE Large surface treatment, creation of radicals / reactive species, PECVD, nanocrystalline diamond, etching, surface treatment, sterilization



*Hi-Wave collisional plasma source Air, 10^{-1} mbar, 200 W
Nitrogen, 6×10^{-2} mbar, 8 Hi-Wave sources x 200 W*

Combined with Sairem solid-state microwave generator, this source can maintain plasma at power levels starting from a few W. To correct small mismatches due to change in operating conditions, the variable frequency function of the solid state generator helps with impedance matching.

In multi-source set up – matrix or crown configurations – *Hi-Wave* is ideal for the treatment of large surfaces [3-5] at operating pressures between 10^{-2} mbar and a few 10^{-1} mbar and allows to obtaining over-dense plasmas, **plasma density higher than 10^{12}cm^{-3}** .