Plasmaline
Large Area Plasma Systems

Stan Whitehair
Cober Electronics Inc.

Plasmaline Introduction

Cober Electronics is pleased to announce its Plasmaline system of large area plasma sources, a new concept in large area plasma systems. The Plasmaline system allows scaling to very large areas while maintaining good uniformity and high process rates.

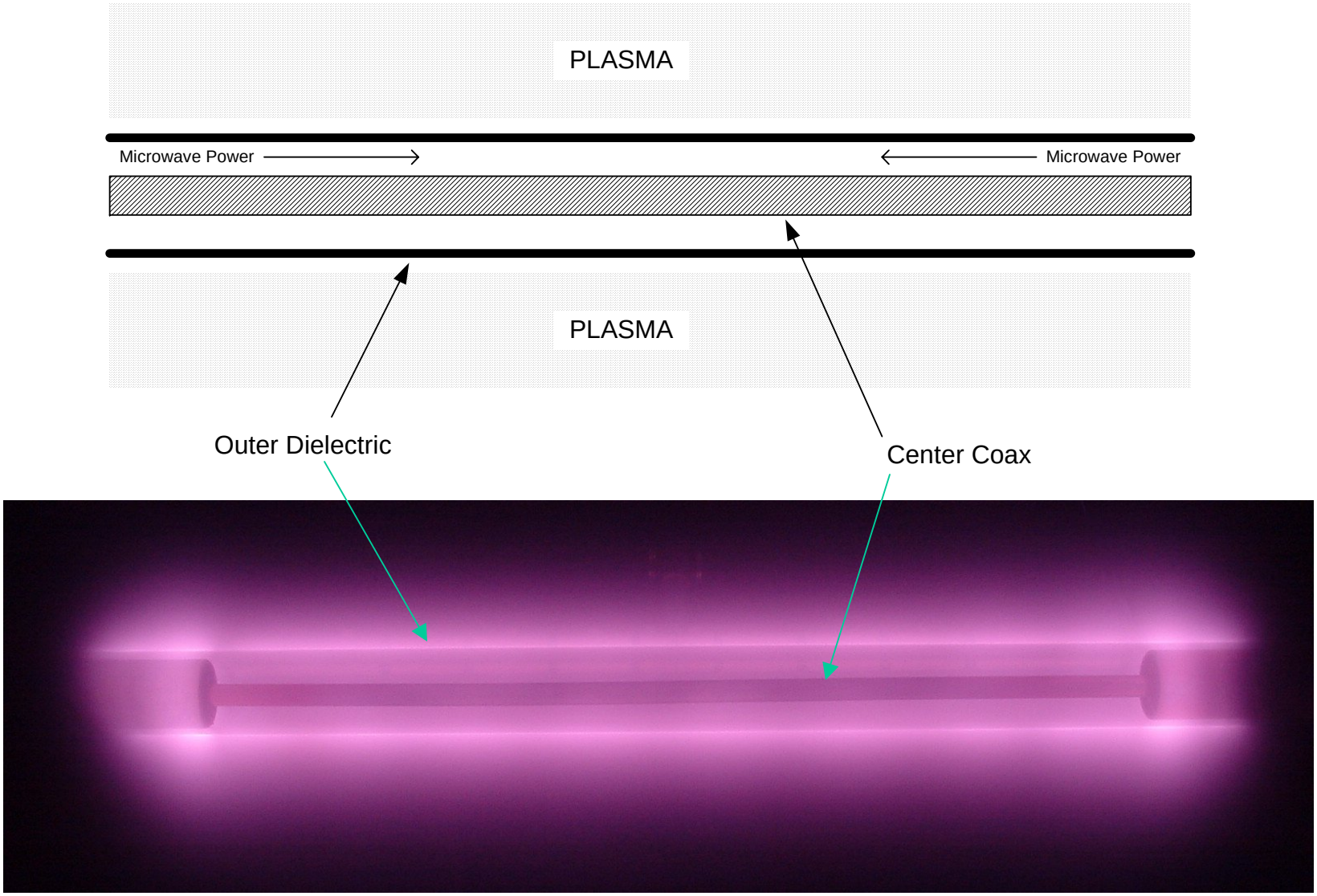
Cober
electronics,inc.

Plasmaline Concept

A quartz, sapphire or alumina tube passes through a vacuum chamber. A copper rod centered in the tube is the inner conductor and the plasma in the vacuum chamber forms the outer conductor of a coax waveguide. Microwaves are fed from both ends into this coax and propagate on the coax, driving and sustaining the plasma. This structure generates a linear extended plasma with its length and density dependent mainly on microwave power and pressure.

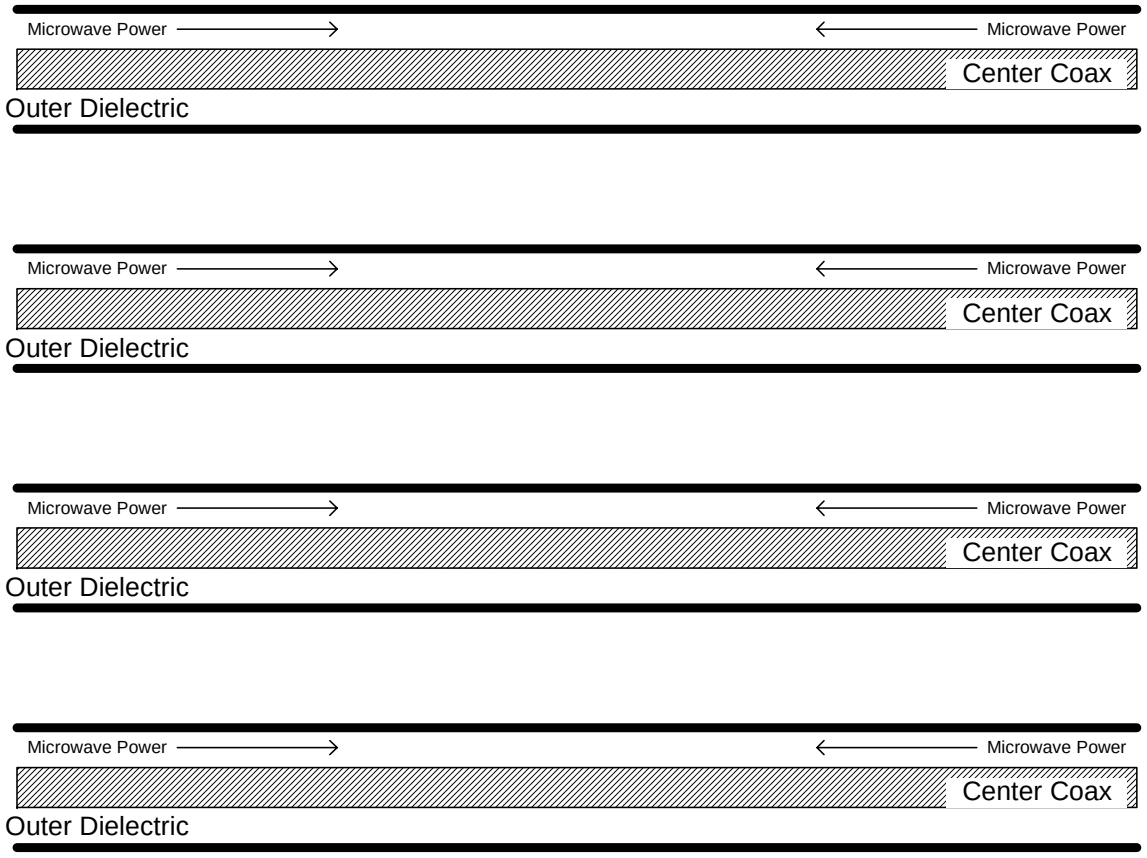
Cober electronics,inc.

Plasmaline Structure



Plasmaline Arrays

Individual Plasmaline units can be combined for processing very large areas. Plasmaline units can be added in parallel to process the desired surface.



Plasmaline

- Plasmaline systems can be built to function at any frequency including 433 MHz, 915 MHz, 2.45 MHz and 5.8 GHz.
- Plasmaline systems can be built at power levels up to 100 kW.
- Plasmaline units of up to 3 Meters have been demonstrated
- Multiple Plasmalines can be driven from a single source using power dividers

Cober electronics,inc.

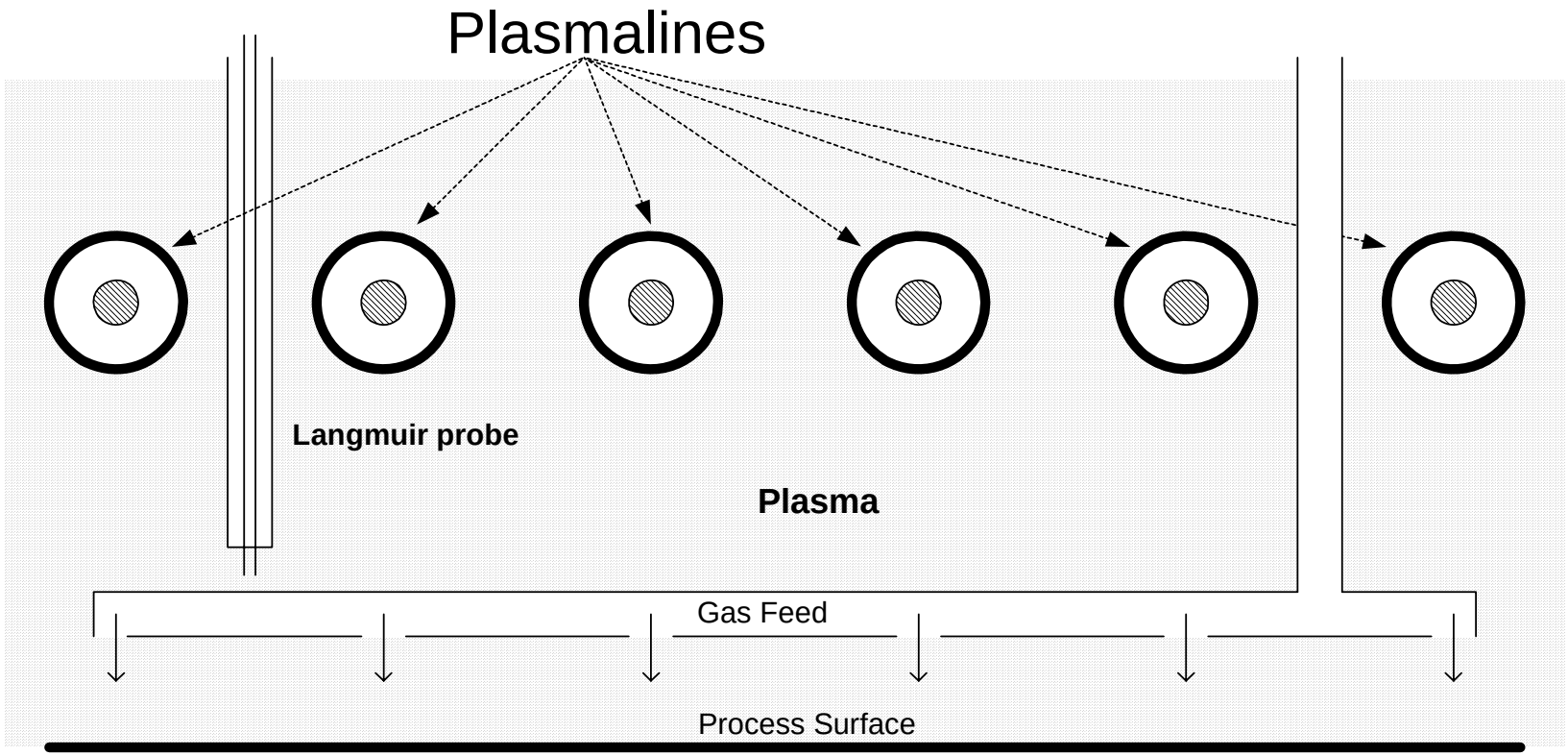
Plasmaline Large Area Plasma Source for Cleaning, Etching and Deposition

- Can be scaled to any size, any width or any length
- Adaptable to cleaning, etching or deposition
- No driving microwave energy at the substrate
- Substrate can be heated or biased as needed
- High density plasma for high rate processing
- Low ion energy for reduced substrate damage

Cober
electronics,inc.

Gas Feeds

Gas feed lines and diagnostic probes can be run between the Plasmalines due to the low field strength in this area. This allows more uniform distribution of process gasses and monitoring of the plasma process.

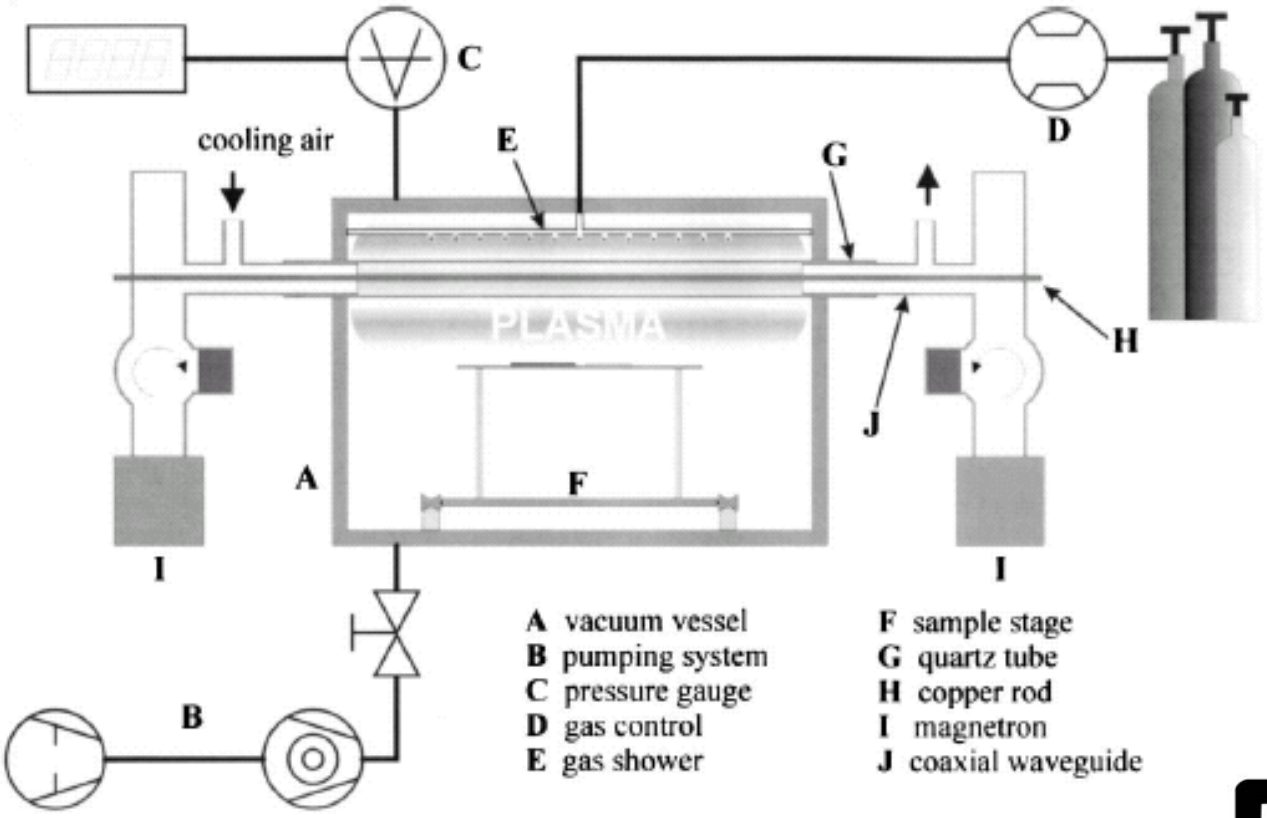


Experimental Results

Large Area Plasma

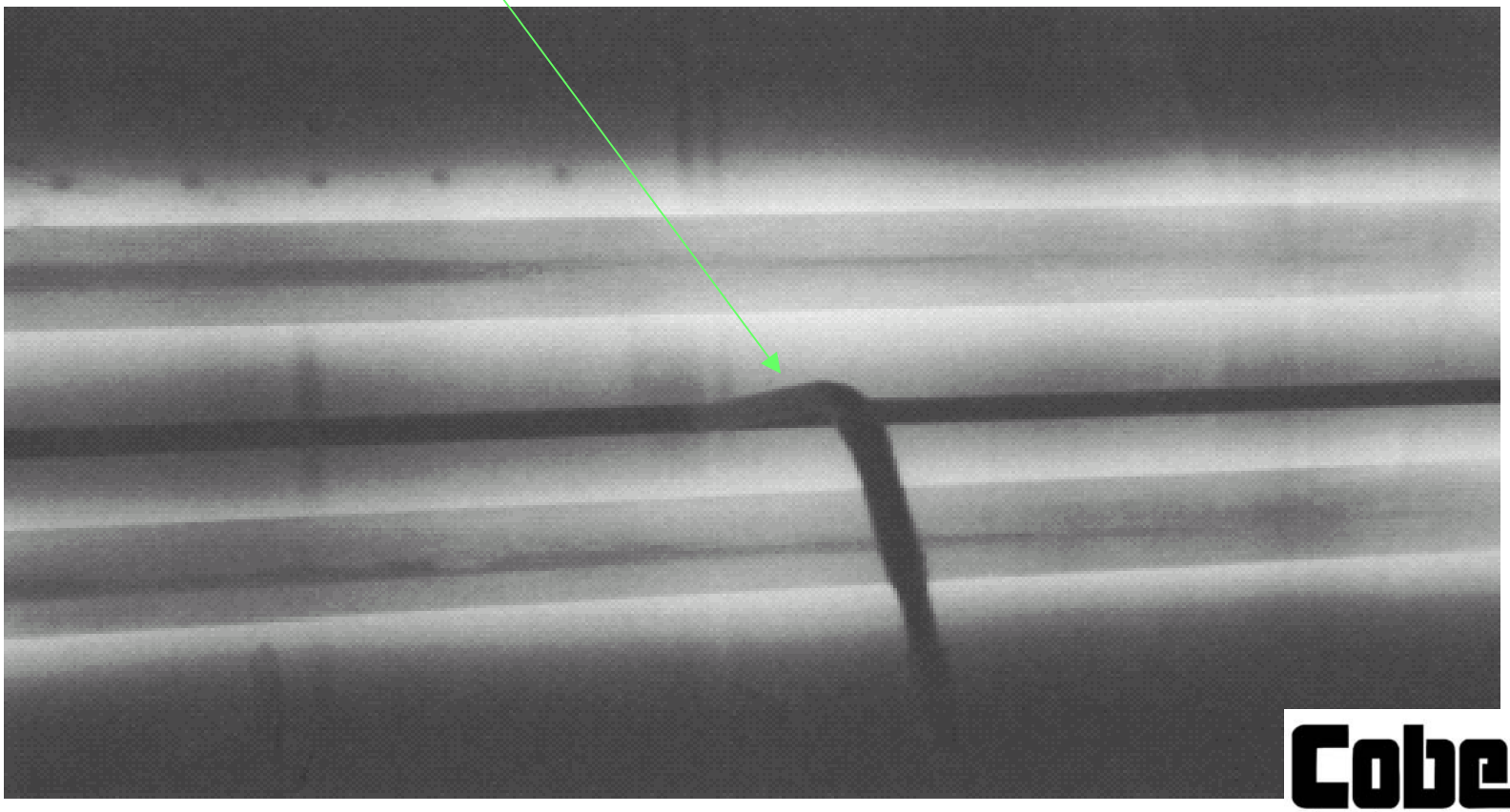
Cober
electronics,inc.

Schematic side view of the plasma source.



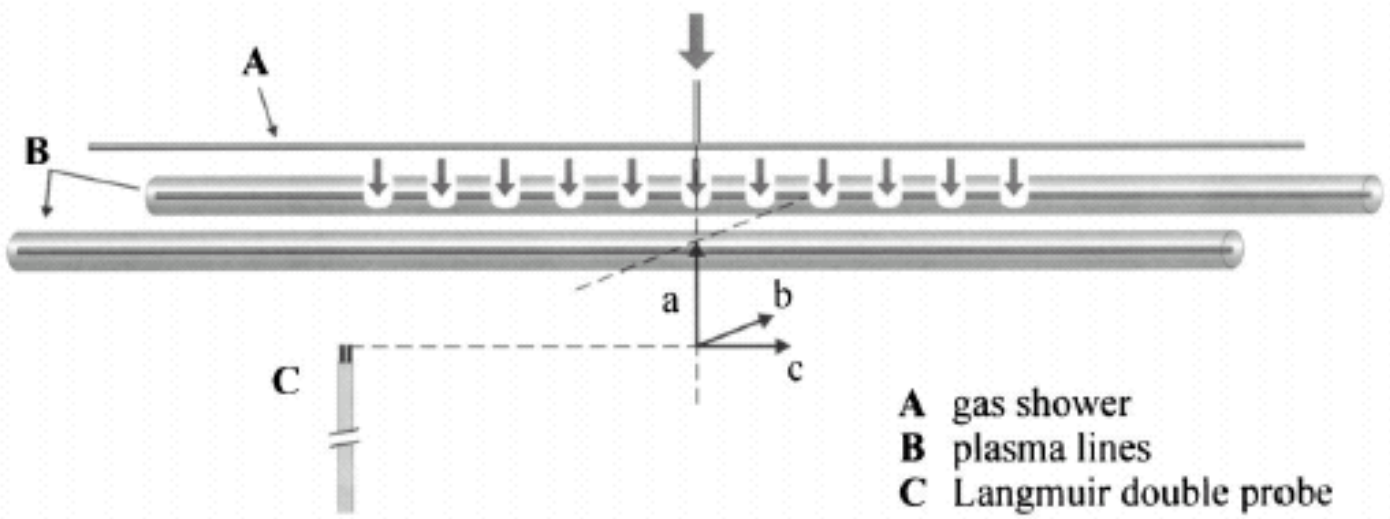
Cober electronics,inc.

Plasma source in operation.



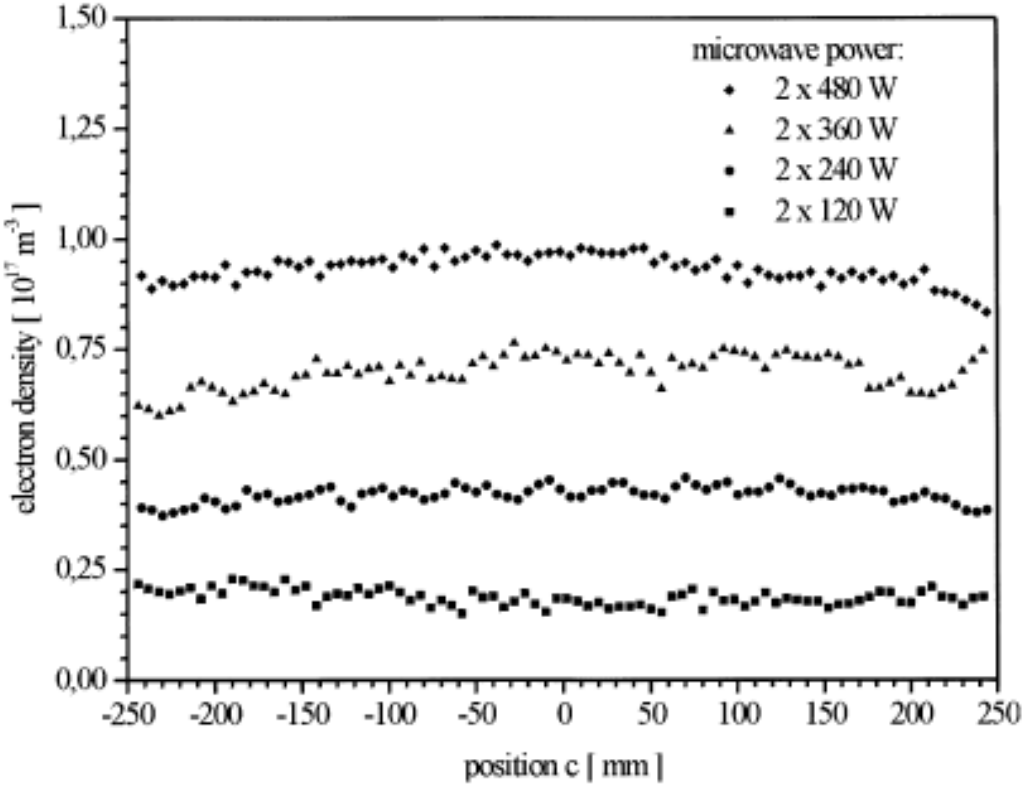
Cober electronics,inc.

Schematic set-up of the Langmuir double probe.



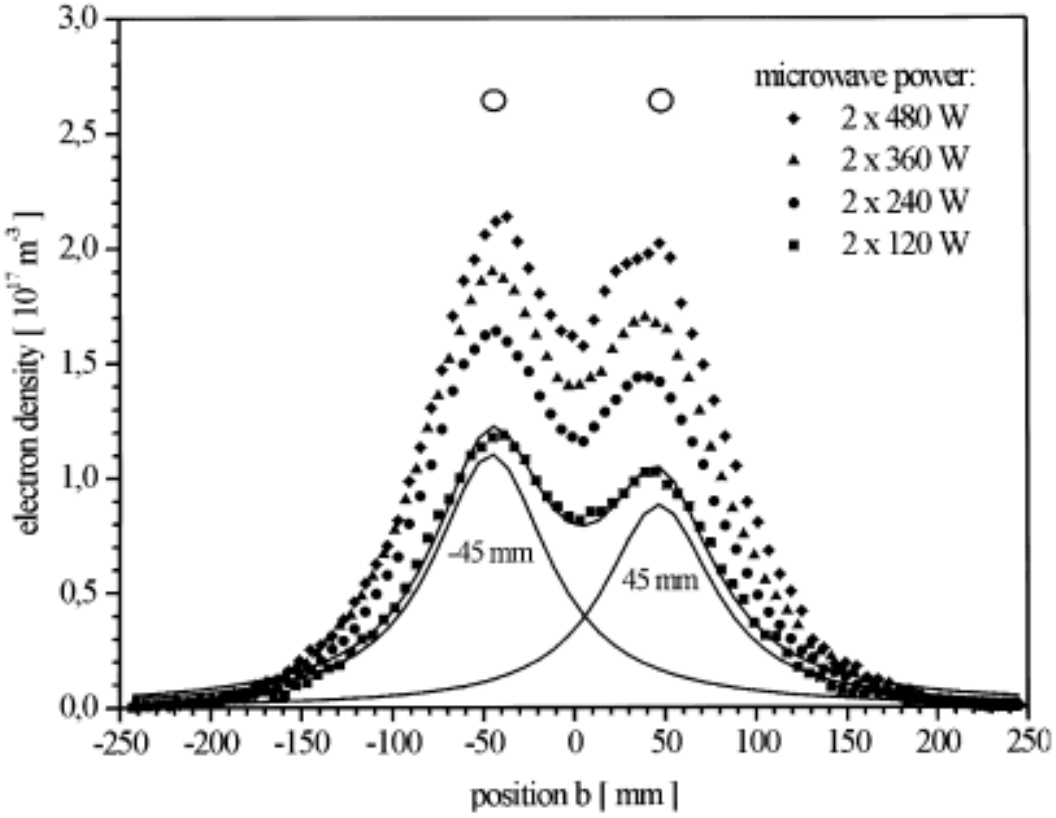
Cober electronics,inc.

Electron density as a function of the parallel position (c) to the plasma source with various excitation powers.



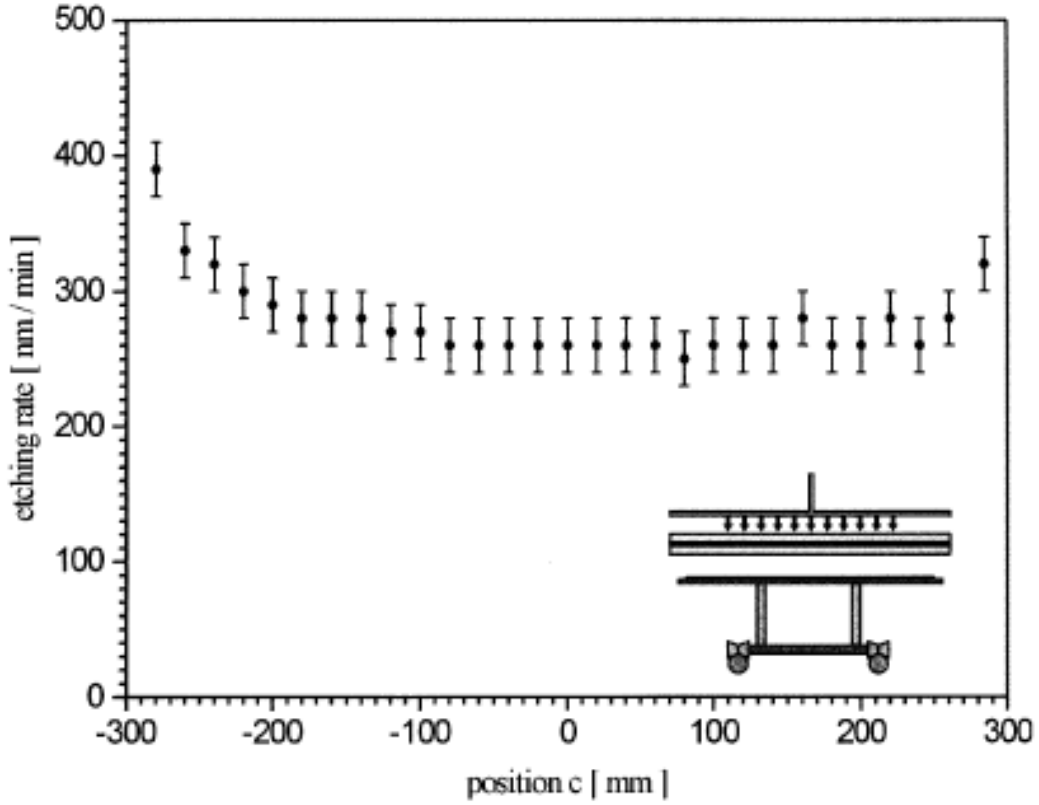
Cober electronics,inc.

Electron density as a function of the perpendicular position (b) to the plasma source for various excitation power



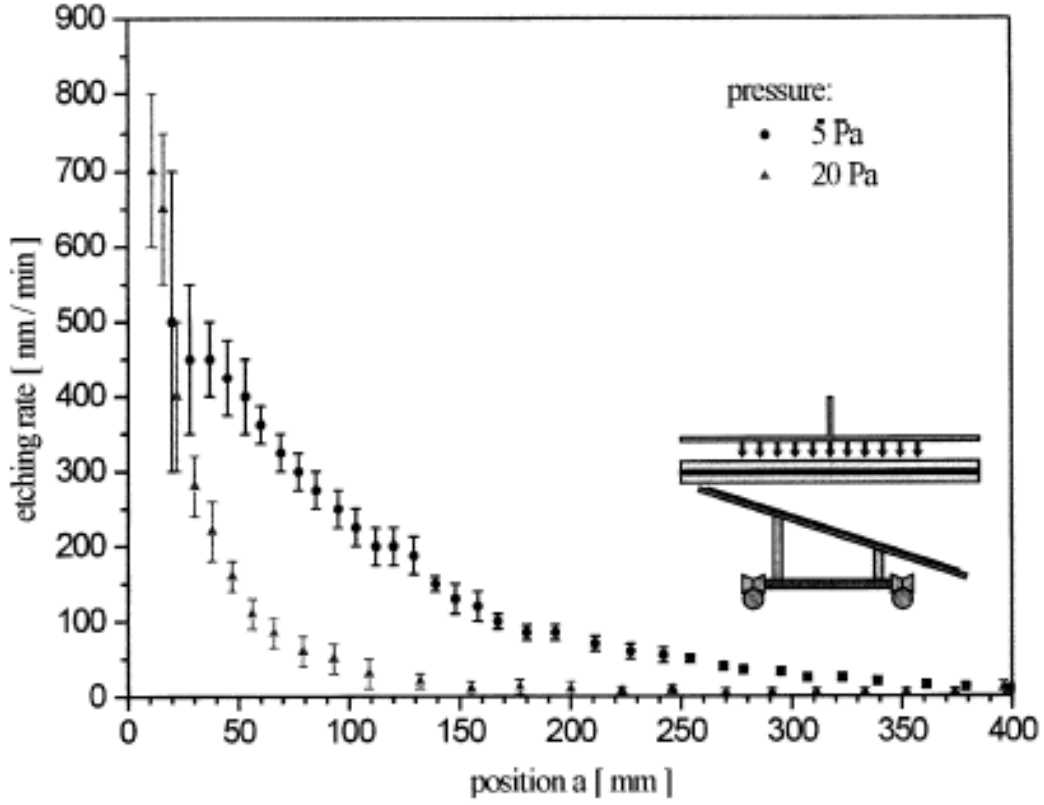
Cober electronics,inc.

Etching rate of PMMA with oxygen as a function of the parallel position (c) to the plasma source. The insert shows the experimental set-up.



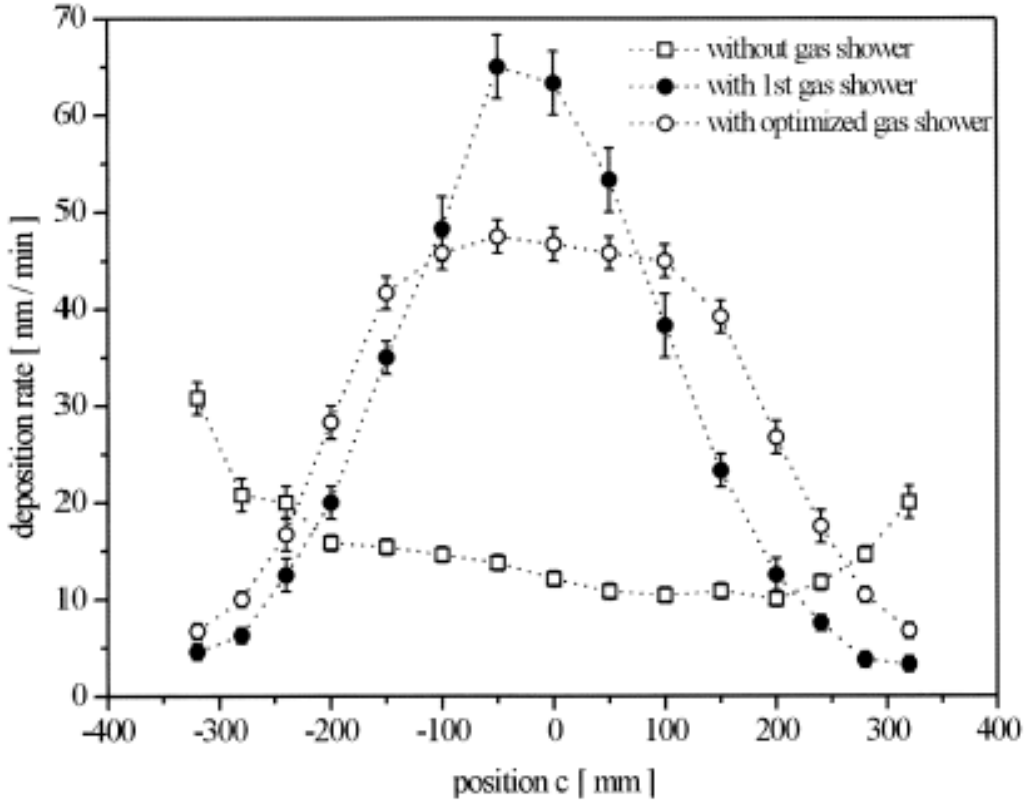
Cober
electronics,inc.

Etching rate of PMMA with oxygen as a function of the distance (a) to the plasma source with various pressures. The insert shows schematically the experimental set-up.



Cober
electronics,inc.

Deposition rate of quartz-like thinfilms as a function of the parallel position (c)to the plasma source with various gas inlet constructions.



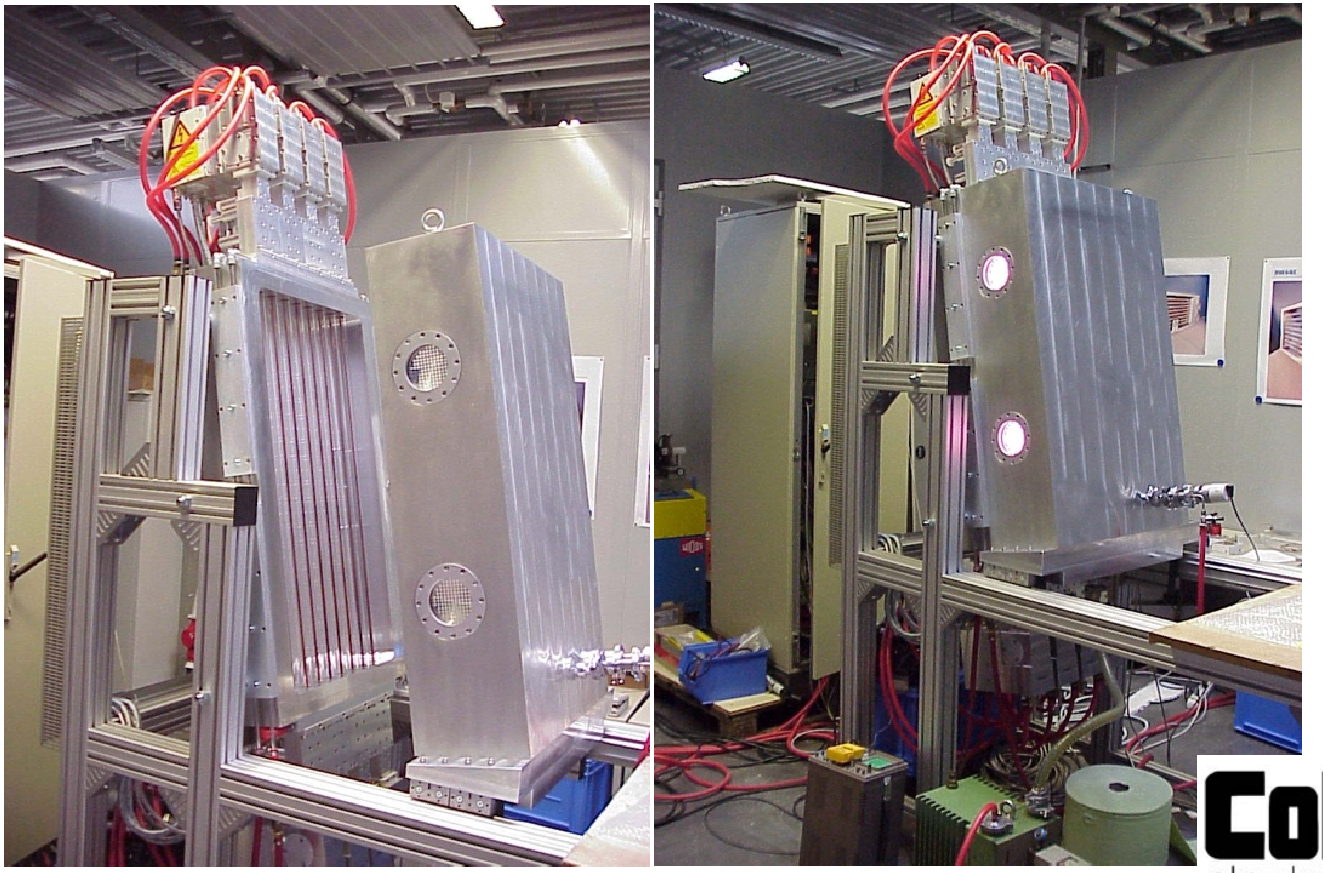
Cober electronics,inc.

Examples

Large Area Plasma

Cober electronics,inc.

Solar Cell CVD System

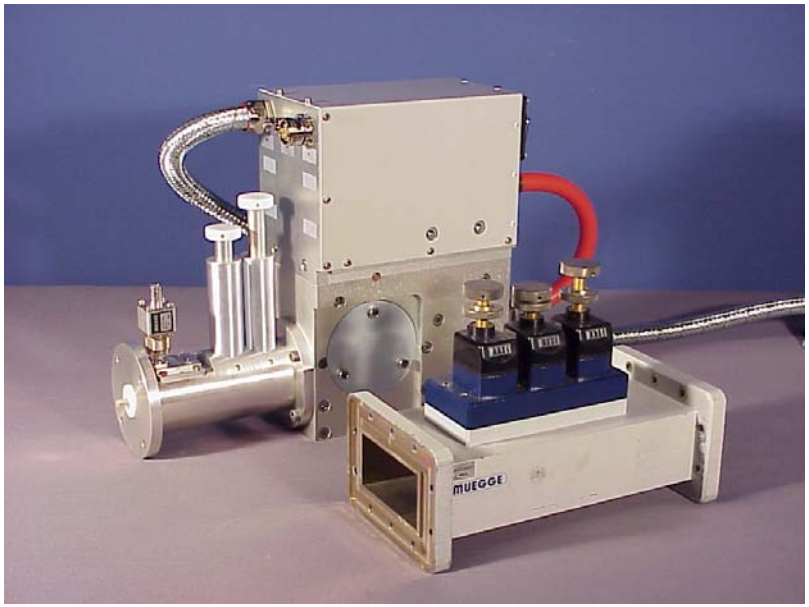


Cober
electronics,inc.

System Components

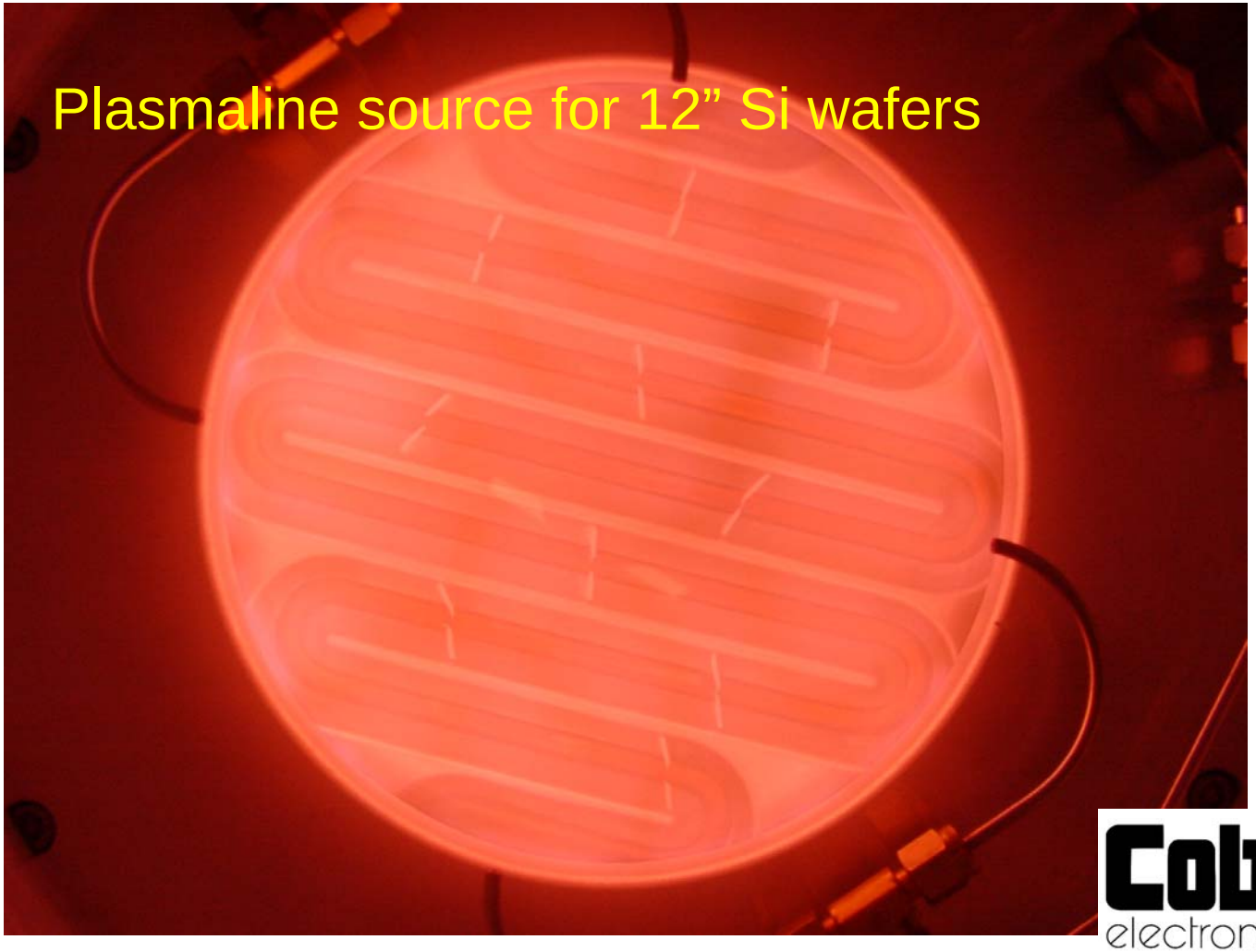
Plasmaline Array

Power Supply and Tuner



Cober electronics,inc.

Plasmaline sources can also be built for round plasma structures



Cober electronics, inc.