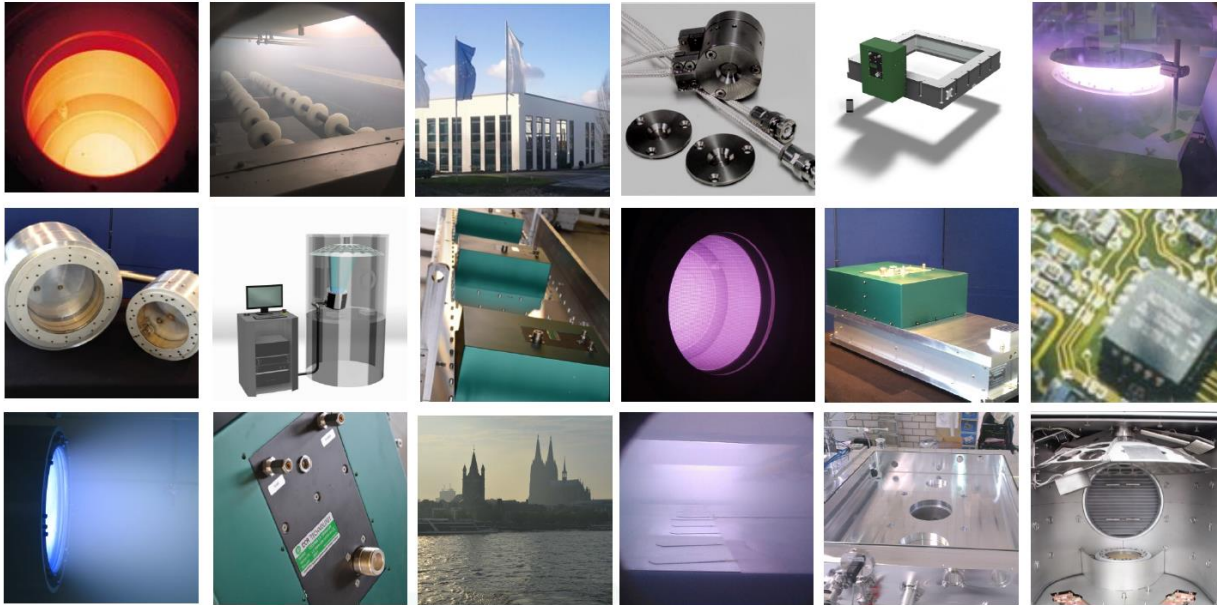




# CCR Technology

## COPRA® RF-ICP-Plasma Solutions

PECVD-PVD Assist-Etching-Cleaning-Activation-PALD



COPRA LS & RS-Series for Cleaning, PVD-Assist, Etching & Large Area PECVD



## CCR „COPRA“ Plasma Technology®

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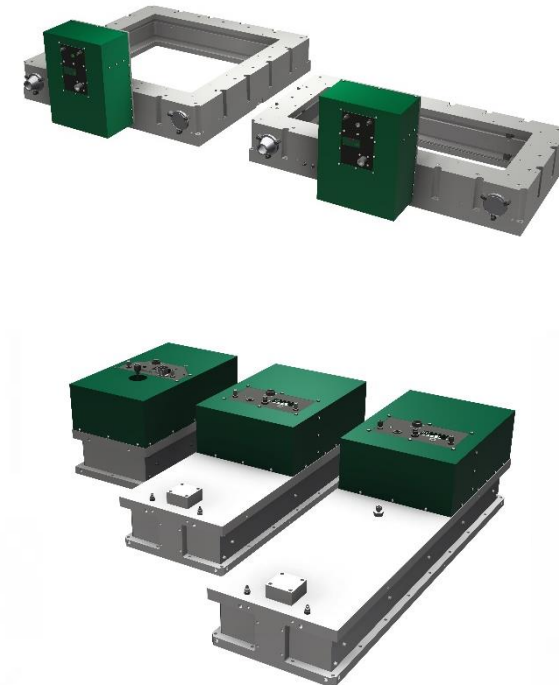
CCR Technology  
Camp-Spich-Strasse  
D-53842 Troisdorf  
[www.ccrtechnology.de](http://www.ccrtechnology.de)

The COPRA technology is patent protected!  
US 6,936,144 B2



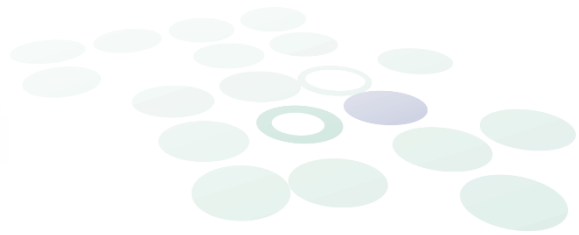
# CCR Technology

## COPRA ICP-Plasma Beam Sources



- Competitive, industrial coating solutions
- Easy to install (Matchbox integrated), scale and reliable performing

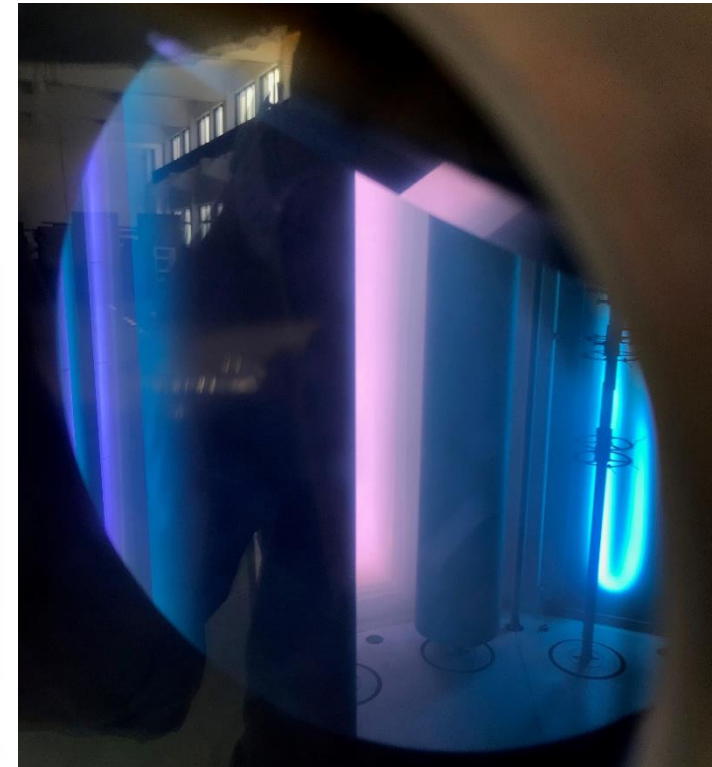




## Main Applications

- PVD-Assist Large Area Sputter Assist for precision optics
- Cleaning
- Activation
- Oxidation
- Nitriding
- Densification

# CCR Technology

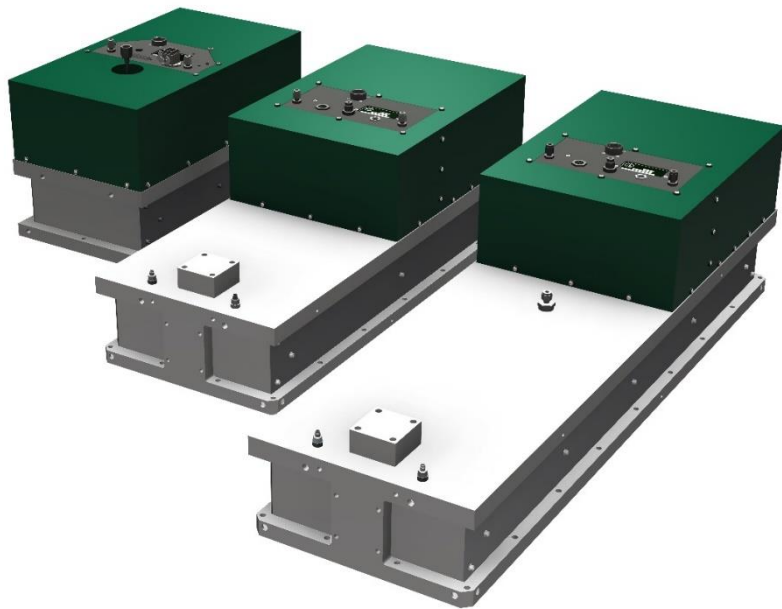


COPRA LS simultaneously working with HiPIMS



# CCR Technology

## COPRA LS-Series for PVD-Assist, Cleaning & Activation



- COPRA LS358x156; LS670x201; LS950x201; LS1100x201

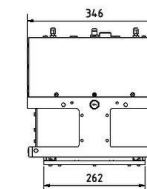
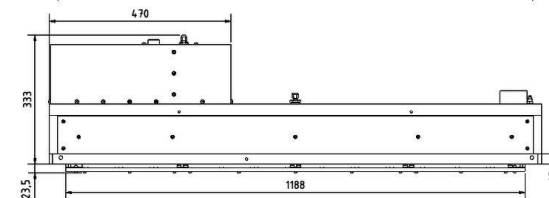
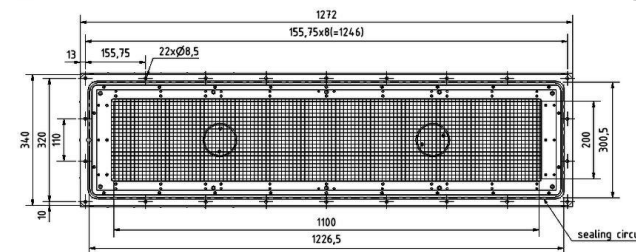
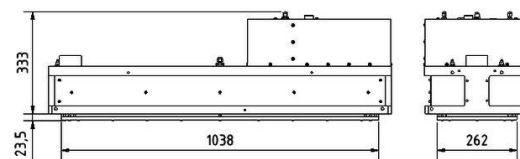
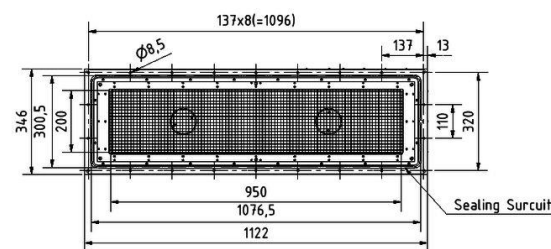
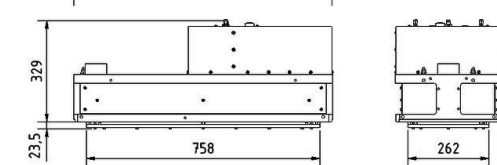
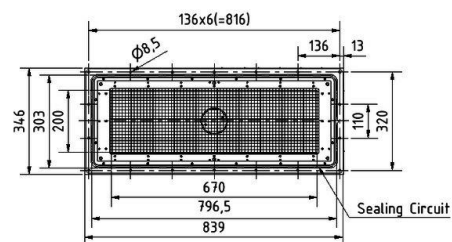
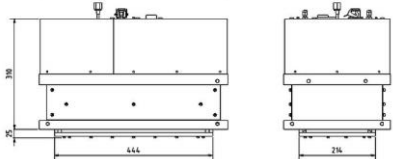
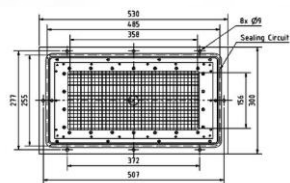
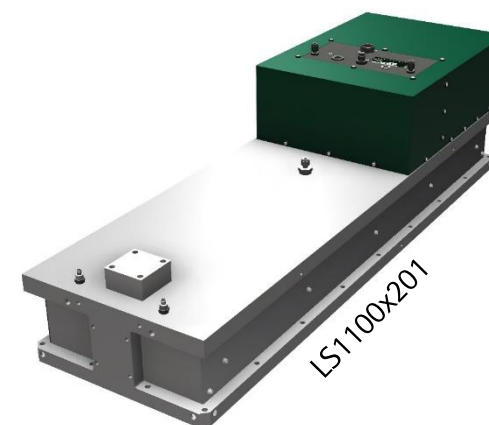
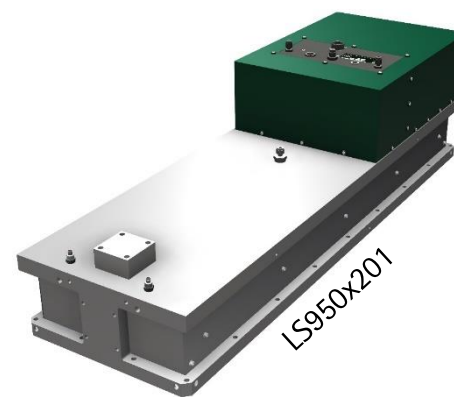
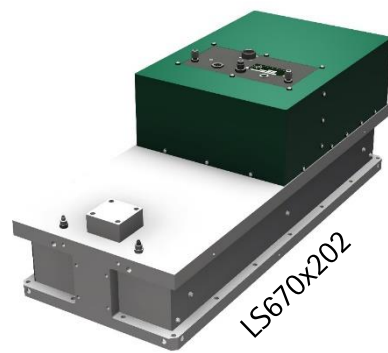
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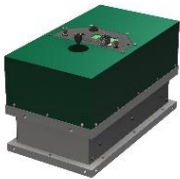
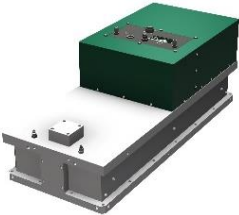
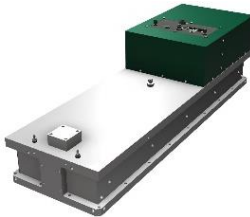
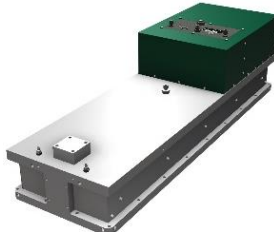
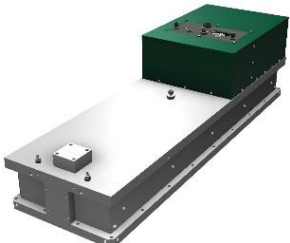
Application example  
Used for PECVD, post oxidation & plasma pre treatment



LS358x156



## Main Specification COPRA LS-Series

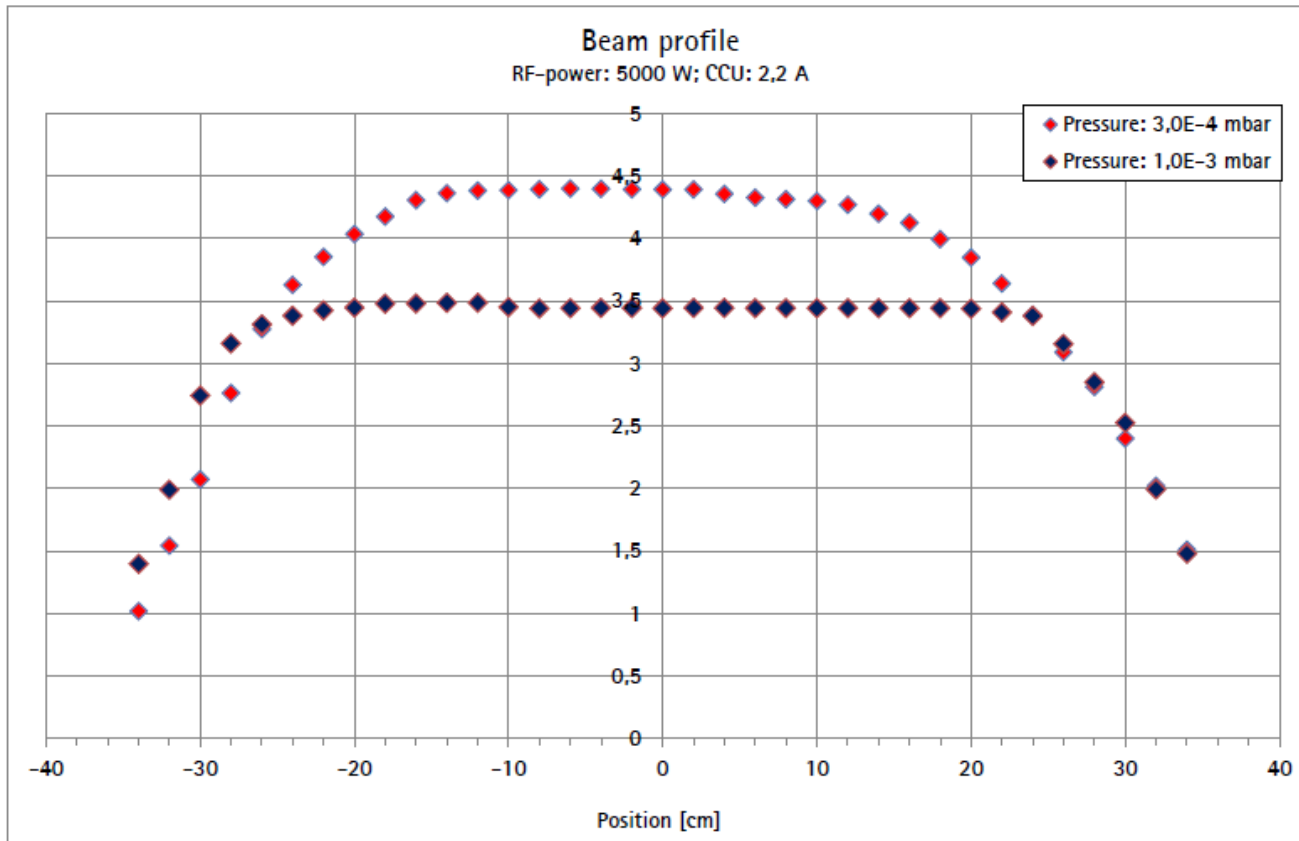
LS Series	LS358x156-GR	LS670x202-GRPE	LS950x201-GRPE	LS1100x201-GRPE	LS1300x201-GRPE
					
Plasma Opening	358x156 mm	670x200 mm	950x200 mm	1100x200 mm	1300x200 mm
Pressure Range	$2 \times 10^{-4}$ to $1 \times 10^{-2}$ mbar	$5 \times 10^{-4}$ to $1 \times 10^{-2}$ mbar	$3 \times 10^{-4}$ to $1 \times 10^{-2}$ mbar	$3 \times 10^{-4}$ to $1 \times 10^{-2}$ mbar	$3 \times 10^{-4}$ to $1 \times 10^{-2}$ mbar
RF-Power (max.)	5 kW	5 kW	6 kW	6 kW	6 kW
Substrate width (dynamic)	300 mm	600 mm	850 mm	1000 mm	1200 mm
Plasma	neutral beam	neutral beam	neutral beam	neutral beam	neutral beam
Frequency	13,56 MHz	13,56 MHz	13,56 MHz	13,56 MHz	13,56 MHz
Body	AL	AL	AL	AL	AL
Process gas	almost any	almost any	almost any	almost any	almost any
Operation pure O <sub>2</sub>	YES	YES	YES	YES	YES
Matching	via remote control CRC	via remote control CRC	via remote control CRC	via remote control CRC	via remote control CRC
Integrated Matchbox	YES	YES	YES	YES	YES

\*pressure, power & distance dependent



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## Example 02 Beam profile of COPRA LS670x202 [mA/cm<sup>2</sup>]

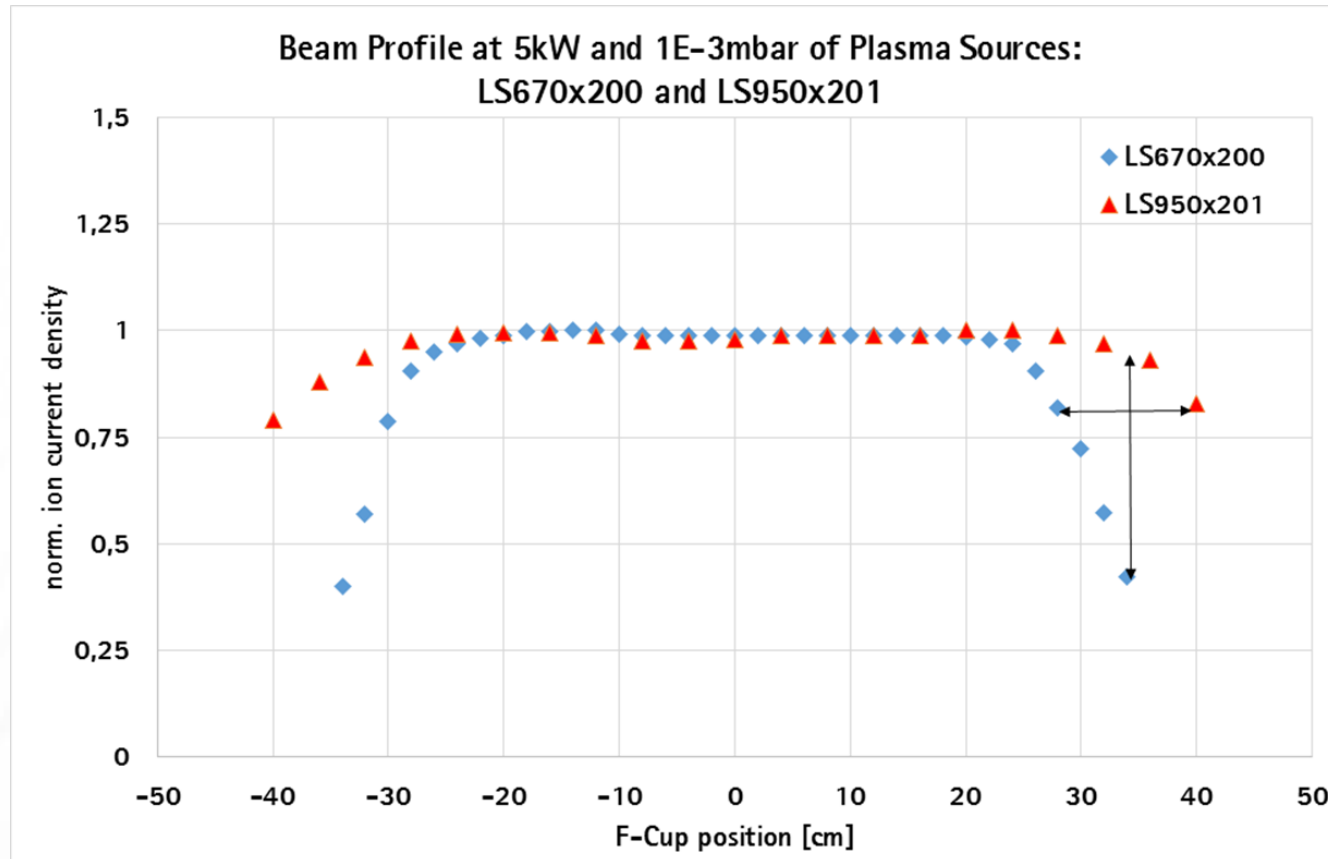


- O<sub>2</sub> Beam profile LS670x202
- Coverage of total uniform area of effective 500mm width with very high Ion current density of 3.5 mA/cm<sup>2</sup> at pressure of 1,0E-3 mbar
- Scalability of COPRA allows to operate with similar beam performance also on bigger source types → behavior of Beam profile is similar at the edges independent from source size



# CCR Technology

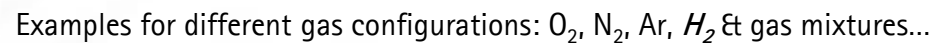
## Example Comparison O<sub>2</sub> Beam profile of COPRA LS670x200 & LS950x201 [mA/cm<sup>2</sup>]

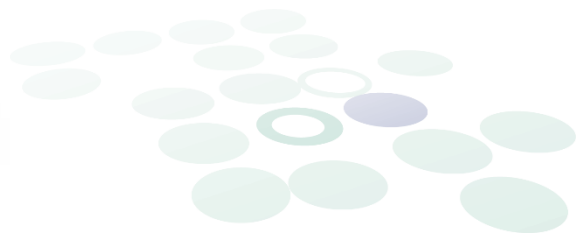


- Comparison Example of ICD Profile of LS670 and 950 with the same parameter
- Scalability of COPRA allows to operate with similar beam performance also on bigger source types → behavior of Beam profile is similar at the edges independent from source size
- These profiles and Data are just examples and pressure, distance and systems depending



- The COPRA Plasma Sources can work with nearly any gases and pure gas types as well as gas mixtures. No operation gas is needed.
- This allows to operate directly with the process gases
- The COPRA can operate with pure fluorine based gases  
*the right picture shows e.g. pure SF<sub>6</sub> Plasma*
- Even pure H<sub>2</sub> Plasma can be generated easily





## Benefits of COPRA ICP Linear Sources

- already proven in large area production
- same working pressure like sputtering  $1 \times 10^{-4}$  to  $1 \times 10^{-2}$  mbar
- ion current density control independent from ion energy
- enable coatings at lowest process temperature > low substrate heating
- upgradeable on existing machines
- no interference with other devices like Magnetrons, HiPIMS, etc
- simultaneous operation with 2, 3 or more COPRA sources possible

## „COPRA“-Benefits

### Technical Benefits

- Integrated Matchbox
- Operation with nearly any gas
- Operation with pure gases
- High efficiency with nearly 90% dissociation
- Wide pressure range  $1 \times 10^{-4}$  to  $1 \times 10^{-1}$  mbar
- No filament, no neutralizer, quasi neutral beam
- Ion Current density control independent from Ion energy
- Operation at sputter pressure range
- Plasma densities up to  $10^{12} \text{cm}^3$
- Highest RF-power transmission efficiency
- Surface activation within seconds
- Lowest temperature rise on substrate
- Drift-free and compressive stress-less coatings
- Plasma beam source with large flux of activating species
- Enable coatings at lowest process temperature
- \*\*high deposition rates up to 10nm/sec
- \*\*high throughput

\*\*additional benefits especially for PECVD process

### General Benefits

- Industrial proven
- Long term process stability
- Maintenance poor
- Scalable to custom size
- Easy to service
- Low operating costs
- Low maintenance costs
- No down times
- Runs with all established 13,56 MHz power supplies
- Wide productportfolio of RF-ICP Plasma sources
- Wafer size specific sources





# CCR Technology

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