



Higher efficiency, higher profitability.

The revolution in excimer radiation:
OSRAM XERADEX® lamp.

SEE THE WORLD IN A NEW LIGHT



Highest efficiency for surface activation and ozone production.

The revolutionary XERADEX® xenon excimer lamp from OSRAM opens up entirely new possibilities in process technology. Our patented pulsed mode of operation yields four times the radiation power of conventional excimer radiators: 40 percent of the input energy are converted into useable vacuum ultra-violet (VUV) radiation. Its high efficiency makes this system ideal for very effective, flexible use in many demanding applications, such as surface treatment, ozone production, laquer frosting and many more.

The unique operating principle leads to unbeatable efficiency – with no cooling required.

The XERADEX® lamp has an outstanding 40 percent conversion efficiency (electrical to UV) compared to 10 percent in conventional sinusoidally driven lamps. This tremendous advantage is due to our patented pulsed operation mode and to the innovative lamp design of XERADEX®. When operated using the corresponding electronic control

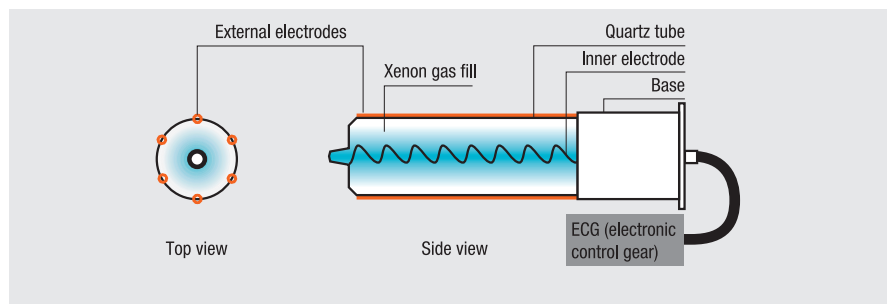
gear (ECG), the result is a compact system of remarkable performance. The quartz bulb functions as a dielectric barrier within a unique electrode system, which prevents the formation of an electric arc during the discharge phase. If xenon is the fill gas – as in the XERADEX® lamps – and if a special pulsed voltage is applied across the electrodes, unstable xenon excimer molecules (Xe_2^*) are formed from the xenon atoms. These molecules dis-

sociate by emitting VUV radiation at 172 nm. The XERADEX® lamps emit incoherent VUV radiation. The exceptional efficiency of this lamp means no cooling of the lamp is required, as the temperature of the radiator never exceeds 80 °C (175 °F).

This flexibility facilitates the integration of XERADEX® systems into even the most sophisticated processes and advanced production equipment.

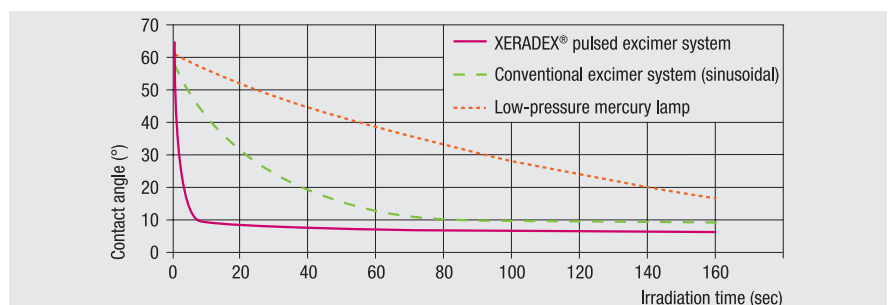
XERADEX® system.

The structure is evident, the secret is in the detail: By means of innovative lamp design and revolutionary technology, the XERADEX® excimer system achieves unprecedented efficiency.



Contact angle vs. irradiation time for different radiation systems.

Modification of contact angle (wettability) of glass surfaces by irradiation with UV energy.



Versatile applications.

XERADEX® unleashes the imagination and opens the doors for new concepts in process technology. Its impressive efficiency and simplicity make this lamp ideal for highly cost-effective solutions in the most demanding applications, particularly in surface cleaning and modification, the production of ozone and numerous other applications.

Fast, thorough and precise: UV/ozone cleaning for semiconductor and FPD production.

Due to more complex surface structures and increasing packaging densities of electronics, demand for new cleaning methods is increasing in both semiconductor and flat panel display (FPD) industries.

The XERADEX® lamp opens new possibilities for innovative dry cleaning processes. At 166 kcal/mol (7.2 eV), the high photon energy of the radiation breaks even tenacious molecular bonds quickly and efficiently. The concurrent production of ozone and oxygen radicals accelerates cleaning and thus reduces process time considerably. In particular, oxygen radicals $O(^1D)$, which are the major contributor to surface cleaning effects, are formed in large quantities by the XERADEX® technology. The UV/ozone cleaning mechanism enables processes like the removal of organics (e.g. photoresist from wafers and photo masks) and the activation of surfaces in semiconductor applications, often minimising or eliminating the use of harsh chemical treatment steps.

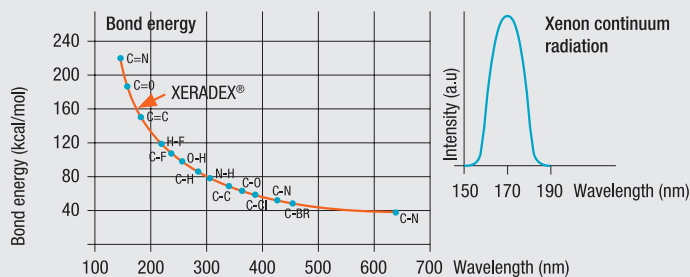
In liquid crystal display and plasma display panel manufacturing, the wettability of the mother glass must be increased for subsequent wet cleaning, coating and etching. Irradiation with XERADEX® improves the wettability of glass substrates considerably and is 20 times faster than with low-pressure mercury lamps.

Bond energy.

At a wavelength of 172 nm, the XERADEX® excimer lamp generates pure ultraviolet radiation – high energy at low temperature.

Xenon continuum radiation: 166 kcal/mol.

The XERADEX® VUV excimer radiation breaks all molecular bonds with a bond energy of up to 166 kcal/mol.



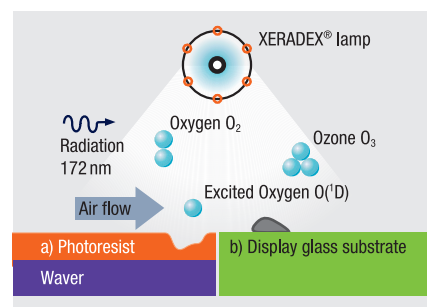
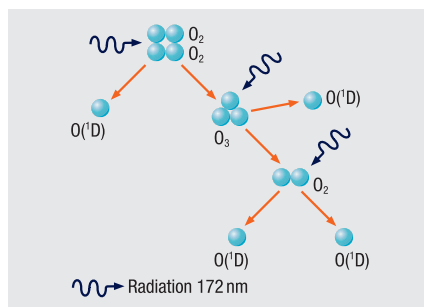
Left: Production of ozone and excited oxygen atoms.

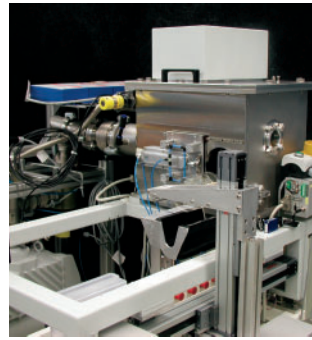
Absorption of 172 nm VUV radiation by oxygen molecules: one reaction leads to the production of ozone and then to excited oxygen. The other reaction produces excited oxygen directly.

Right: UV/ozone cleaning.

Combined effort for clean results: high-energy photons break molecular bonds. The ozone and excited oxygen produced by the radiation accelerate the cleaning process.

- a) Photoresist removal
- b) Display cleaning





Vacuum process chamber.

Fully automatical dual side treatment of glass and other substrate materials under different pressures and process gases.

Surface activation and modification.

- Removal of polymers:
 - Removal of organic residue
 - Cleaning of photo masks
 - Improved coating properties of photosensitive resist
 - Improved yield of deposition
 - Resist removal
 - Etching (e. g. Teflon®)
- Surface treatment:
 - Activation of surface bonds
 - Adjustment of wetting angle
 - Higher coating yield
 - Better bonding performance
 - Faster and better vacuum in process chambers
- No external ozonator required for the UV/ozone cleaning process.

- Photo-induced metallisation at room temperature on various surfaces, e. g. plastics.
- Photo-induced CVD at lower process temperatures (high k-deposition, high growth rate, low temperature).
- Laquer frosting: microfolding of radiation curable coatings to generate dull surfaces.

Ozone production.

- Direct dissociation of oxygen by the high energetic XERADEX® radiation and formation of ozone: no by-products, such as NO_x, are produced.
- Highly efficient ozone production with the XERADEX® lamps. Ozone yield: 82 g/kWh.
- No cooling required.
- In-situ production of ozone.

Other fields of application.

- Evaluation of fluorescent substances.
- Photochemical experiments.
- Oxidation in solar cell manufacturing processes.



Irradiation of glass substrates for improving wettability before deposition of magnetic layers.

Fit for the future.

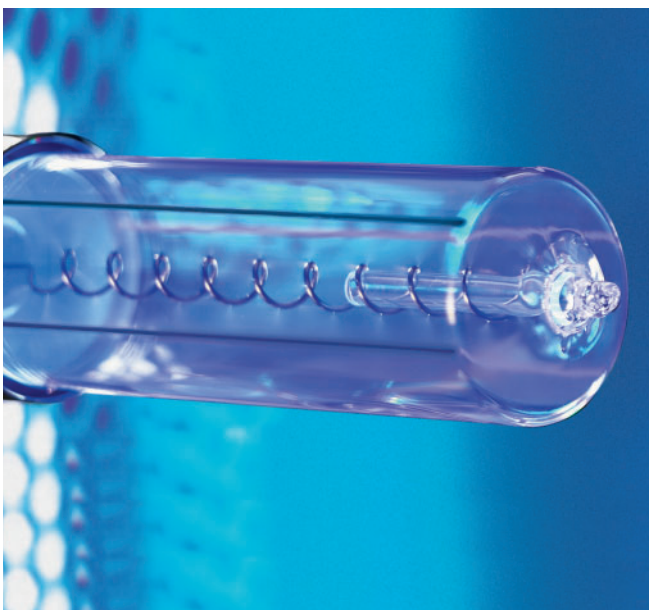
Unique advantages.

The compact XERADEX® lamp offers a multitude of advantages to the user:

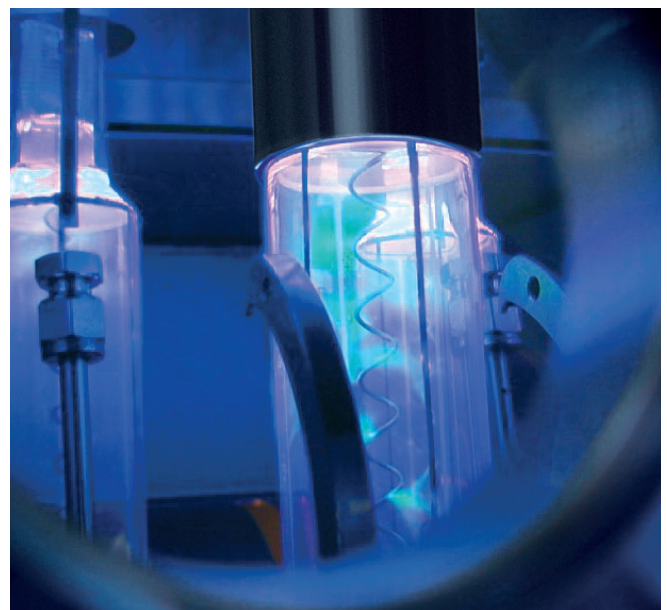
- For the first time, a highly efficient VUV radiation source is available for different demanding industrial applications.
- Its 40 percent efficiency eliminates the need for cooling of the lamp – the temperature of the radiator never exceeds 80 °C (176 °F) “cold radiation”; low temperature processing is possible.
- The system of lamp and electronic control gear is compact and easy to handle.
- Convenient, compact irradiation systems are possible, minimising space in costly cleanroom environments.
- Lamp starts instantly with no warm-up phase; the ignition is independent of the ambient temperature; no shutters are necessary.
- No limitations on switching cycles; capable of instant restrike with no detriment to lamp life.
- PLC control output.
- Operation of the lamp in different environments is possible, such as in gaseous media and under vacuum conditions.
- The lamp is environmentally friendly; it contains inert gases exclusively with no mercury used.

A profitable investment: OSRAM XERADEX® excimer lamp.

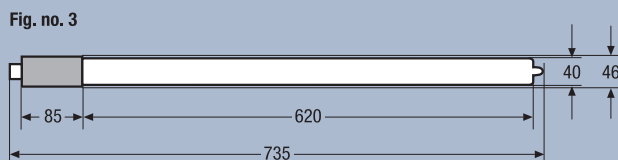
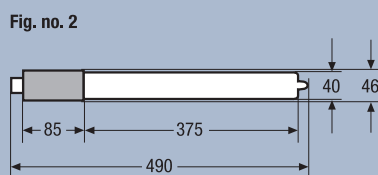
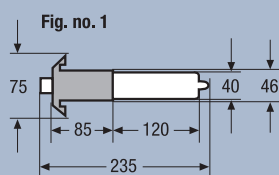
The use of the superior OSRAM XERADEX® lamp in place of conventional surface treatment methods is highly worthwhile in spite of higher initial costs.



XERADEX® excimer system with 20W lamp in operation.



View inside the process chamber (from previous page).



All Dimensions in mm

Product name	Electrical input power	VUV radiation power	Lamp length	Bulb diameter	Bulb length	Base	Irradiance	Order code
OSRAM XERADEX®								
XERADEX 20	20W	8W	235 mm (9.6 in.)	40 mm (1.5 in.)	120 mm (4.7 in.)	DN 50 KF flange	50 mW/cm ²	20W/L40/120/SB-SX46/KF50
XERADEX 50	50W	20W	490 mm (18.7 in.)	40 mm (1.5 in.)	375 mm (14.2 in.)	Cylindrical	50 mW/cm ²	50W/L40/375/SB-S46/85
XERADEX 100	100W	40W	735 mm (27.4 in.)	40 mm (1.5 in.)	620 mm (23.5 in.)	Cylindrical	50 mW/cm ²	100W/L40/620/SB-S46/85

Other lamp lengths and bases are available on request.

Product name	Supply voltage	Mains frequency	System power consumption	Dimensions (length, width, height)	Cable length (ECG-lamp)	Fig. number
ECG (electronic control gear)						
DBD-20-110/240	110V, 120V, 230V, 240V optional	50 Hz/60 Hz	28W	(223 mm, 112 mm, 55 mm)	600 mm	1
DBD-100-110/240 (2 lamps)	110V, 120V, 230V, 240V optional	50 Hz/60 Hz	150W (2 lamps)	(282 mm, 175 mm, 80 mm)	600 mm (y-shape)	2
DBD-100-110/240	110V, 120V, 230V, 240V optional	50 Hz/60 Hz	150W	(282 mm, 175 mm, 80 mm)	600 mm	3

Each radiator may only be operated with specified control gear DBD-20-110/240 or DBD-100-110/240. XERADEX® 50 must be used with 2 lamps and one ECG DBD-100-110/240.

Tailor-made lamps and electronic control gear (ECG).

XERADEX® is of modular design. Different bases and bulb lengths can be combined, either for use in standard conditions (from atmospheric pressure down to 300 mbar) or at high vacuum (below 10–3 mbar). For each lamp, the appropriate power supply must be used. Standard lamps are available in 20W, 50W, and 100W configurations (technical data above). Other wattages, bases, bulb geometries and lengths are available on request.

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