

# PHOTOIONIZATION

Eliminates electrostatic charge problems  
in production processes



**VUV** Ionizer<sup>TM</sup>

The logo features a stylized blue 'i' icon above the text 'VUV Ionizer'. The 'VUV' is in a large, bold, blue font with a white outline, and 'Ionizer' is in a smaller, italicized blue font. A trademark symbol (TM) is at the end.

**PhotolonBar**<sup>TM</sup>

The logo features a stylized red 'i' icon above the text 'PhotolonBar'. The 'PhotolonBar' is in a large, bold, red font with a white outline, and a trademark symbol (TM) is at the end.

**HAMAMATSU**  
PHOTON IS OUR BUSINESS

# Photoionization is. . .

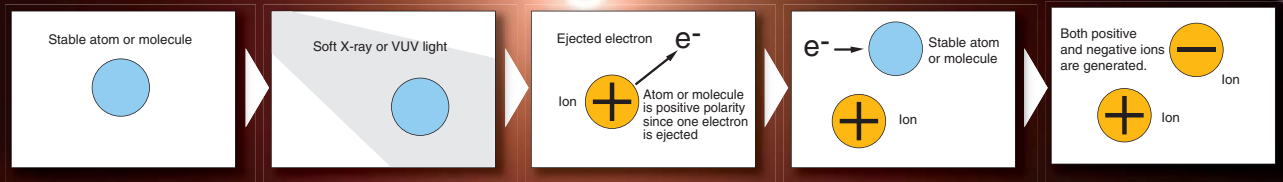
a clean ionization technique that utilizes light to generate ions that neutralize electrostatic charges.

Light can directly ionize atoms and molecules in the air (residual atoms and molecules in case of a vacuum) and so can instantly and very efficiently remove electrostatic charges even from “objects” or “environments” where electrostatic charges have proven difficult to remove by conventional methods.

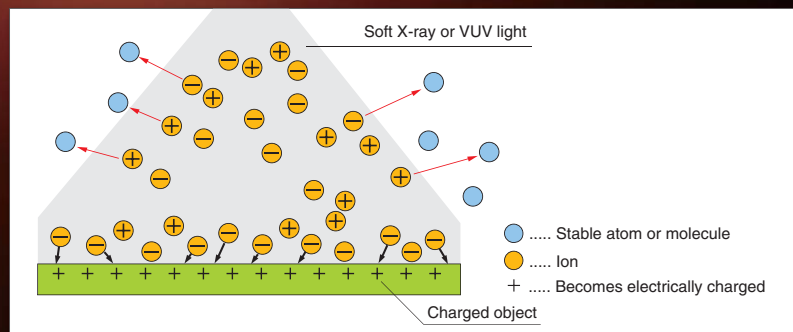
Photoionization helps to improve product yield and throughput in a variety of processes where static electricity can cause problems.

## How “Photoionization (electrostatic charge neutralization by light)” works

When soft X-rays or vacuum ultraviolet (VUV) light hits a stable atom or molecule, an electron is ejected out of the atom or molecule leaving behind a positive ion (positive polarity atom or molecule). The ejected electron then combines with another stable atom or molecule to form a negative ion (atom or molecule of negative polarity).



The ions generated near a charged object are then attracted to the charged object to neutralize the electrostatic charges. All other generated ions return to the atoms or molecules from which they were ejected.



### point 01

#### ●“0 V” neutralization

— High ion density —

Unlike ordinary discharge ionizers that generate ions only in the “area near the discharge electrodes,” photoionization generates high-density ions over the “entire area irradiated with light” to efficiently remove the electrostatic charges.

### point 02

#### ●Needs no air flow

— “Soft X-ray irradiation area” = “Ion generation area” —

Ordinary discharge ionizers generate ions by discharge and send them toward charged objects by air flow. Photoionization constantly generates ions over the entire area irradiated with light. This means that ions are also generated near the charged objects, eliminating the need to send the ions by air flow.

### point 03

#### ●No overshoot (no generation of opposite-polarity charges)

— Good ion-generation balance —

An imbalance in the number of positive and negative ions that are generated can cause overshoot. However in our photoionization process, the same number of positive and negative ions is generated at the same time so there will be no imbalance in positive and negative ions sprayed onto the charged objects and no overshoot occurs.

### point 04

#### ●Generates “NO” dust and magnetic noise

— Ionization by light —

Ordinary discharge ionizers have problems including foreign matter defects that may occur due to dust, malfunctioning peripheral electrical devices due to electromagnetic noise, and electrostatic charges that cannot be neutralized in a vacuum. Photoionization eliminates all of these problems to ensure clean and reliable neutralization and without generating dust and electromagnetic noise.



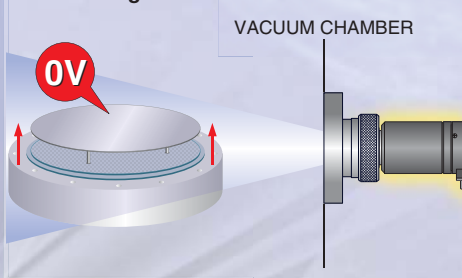
## Neutralizing electrostatic charges in a vacuum



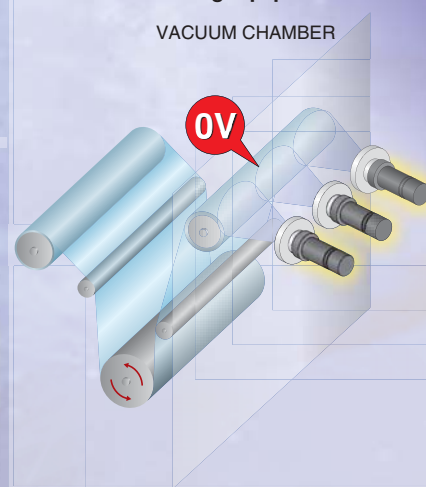
### Applications

- Dechucking of electrostatic chuck
- Semiconductor manufacturing equipment (vacuum process)
- Liquid crystal manufacturing equipment
- Organic EL manufacturing equipment
- Hard disk manufacturing equipment
- Film manufacturing equipment
- Equipment utilizing electron beams (SEM, etc.)

Dechucking of electrostatic chuck



Film manufacturing equipment



## Neutralizing electrostatic charges in the air



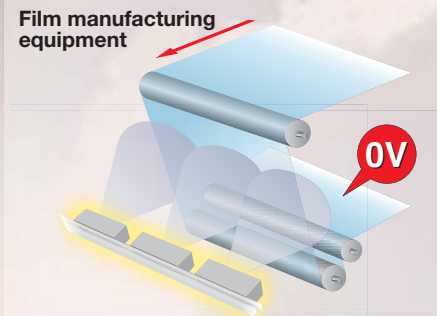
Ionizer heads can be daisy-chained  
to cover a wide neutralization area



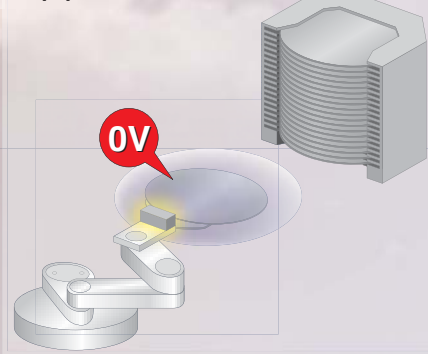
### Applications

- Semiconductor manufacturing equipment
- Liquid crystal manufacturing equipment
- Organic EL manufacturing equipment
- Film manufacturing equipment
- Printing machine
- Surface mounter / chip mounter
- Plastic parts manufacturing equipment

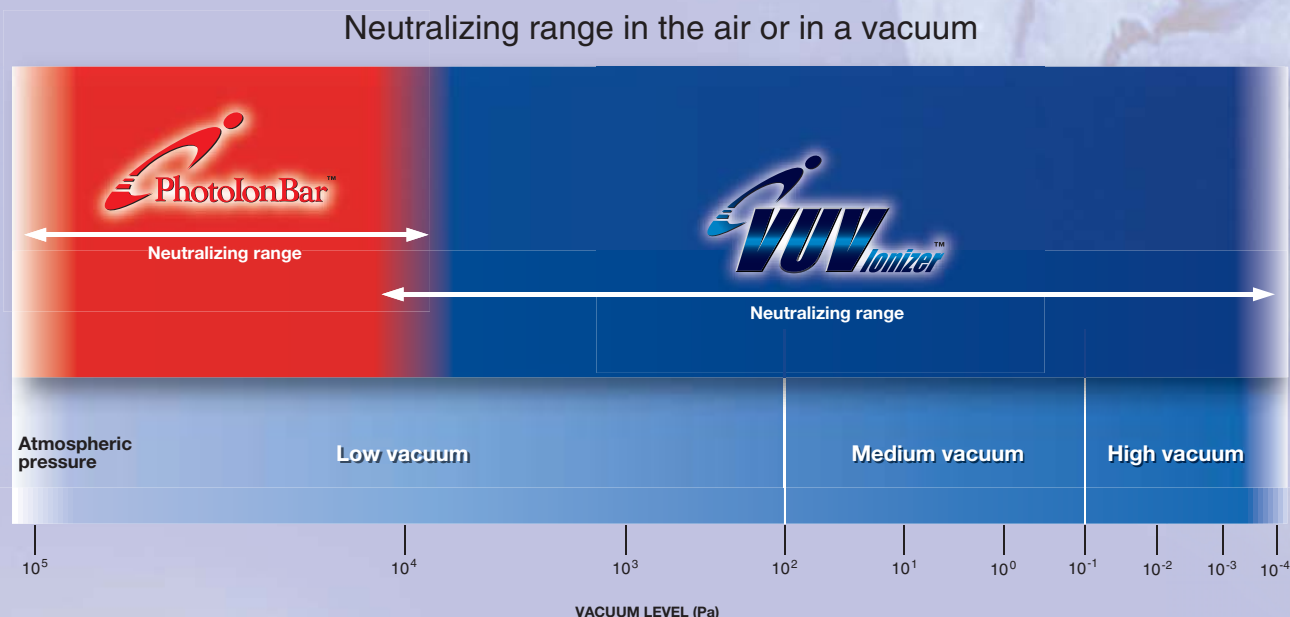
Film manufacturing equipment



Semiconductor manufacturing equipment



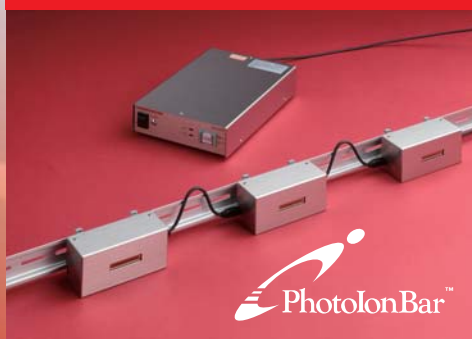
# Gives a high neutralizing effect in various environments!



\*Please contact us for help in removing electrostatic charges in other special environments (in nitrogen, argon or helium atmosphere, etc.)

## Photoionization by soft X-rays

Ensures clean and highly efficient neutralization of electrostatic charges compared to ordinary corona discharge ionization.



Separate product catalogs are available.

## Photoionization by VUV light

Allows neutralizing electrostatic charges under depressurized conditions. This was impossible up to now with conventional ionizers.



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