NANOTECHNOLOGY IN THE INDUSTRIAL AIR PURIFICATION

R-FILTER

UV PHOTOCATALYTIC INDUSTRIAL AIR DISINFECTION AND DEODORIZER DEVICE

Powered by:

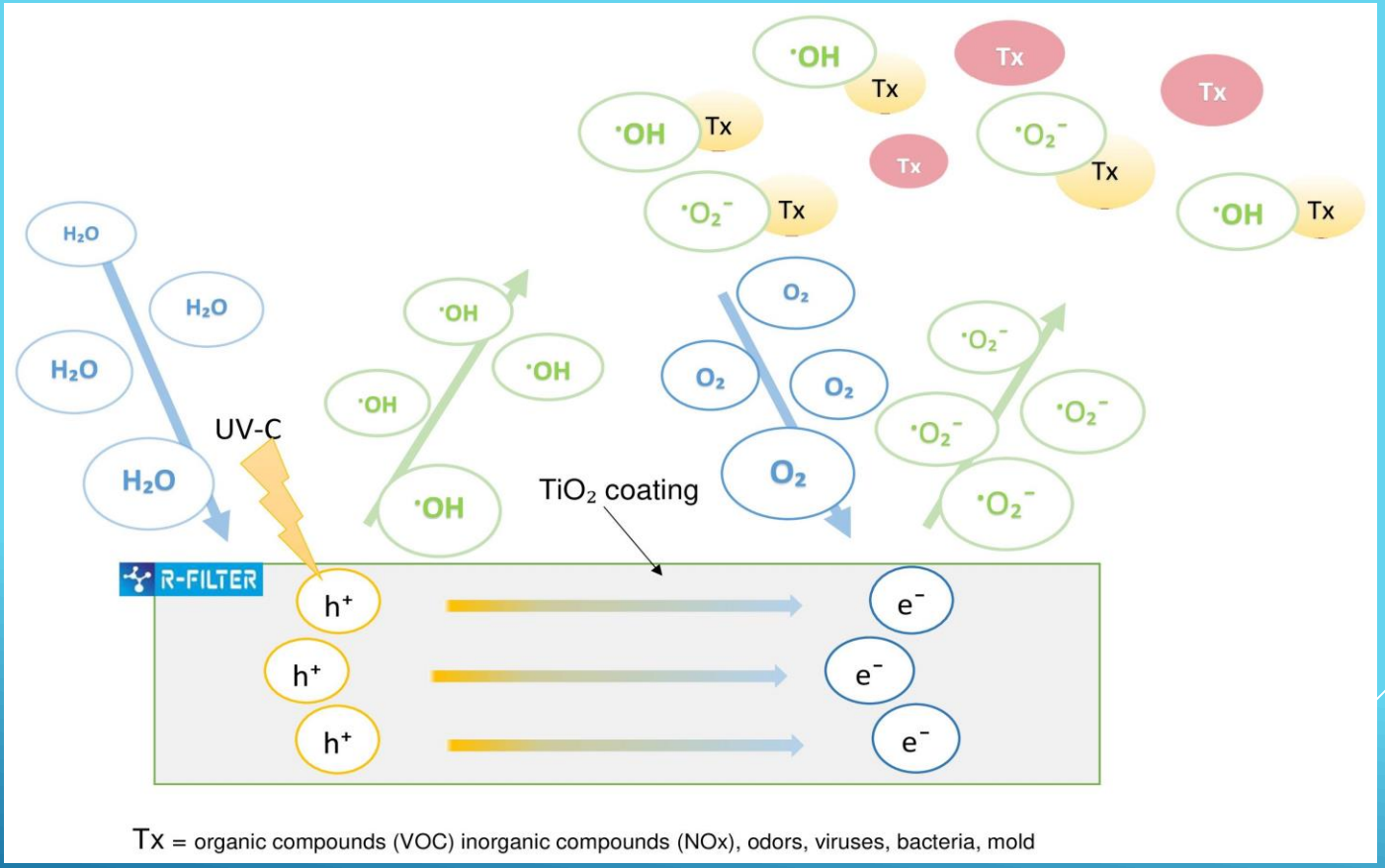
R-FILTER

Have you ever heard of nanotechnology? Or have you heard about nano technology in the air purification, or more precisely in the industrial air purification?

Backround:

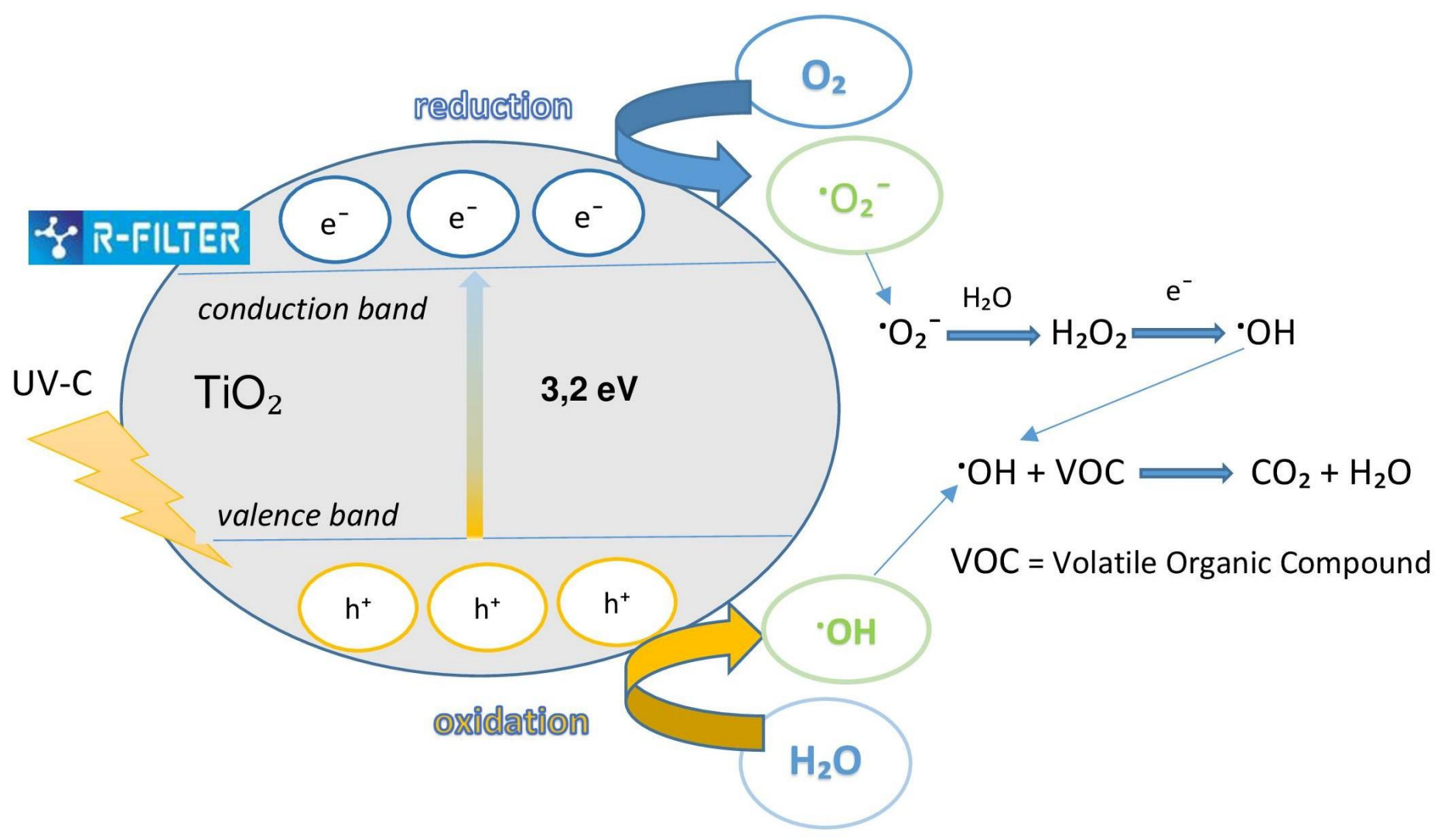
- **It is known that surfaces coated with nano- TiO_2 based photocatalyst show self-cleaning activities under the influence of sunlight**
- **The secret of this success is the nanotechnology**
- **Nanotechnology is manipulation of materials on an atomic, or molecular scale, having size of 0.1 to 100 nm. One meter = 1.000.000.000 nanometer**
- **In photocatalytic air purifiers the catalyst that cleans the air is typically nano-TiO_2 activated by ultraviolet (UV) light**

- Titanium dioxide coated surfaces are used as photocatalyst in our industrial air disinfection and deodorizer device. There are fans in the device to circulate the air in the room, to be deodorized and disinfected.
- The air is first exposed to a disinfecting high-intensity ultraviolet light of germicidal wavelength (254 nm) and then flows touching the surface of the UV light-activated photocatalyst. On the surface coated with TiO_2 the following air purification process takes place:



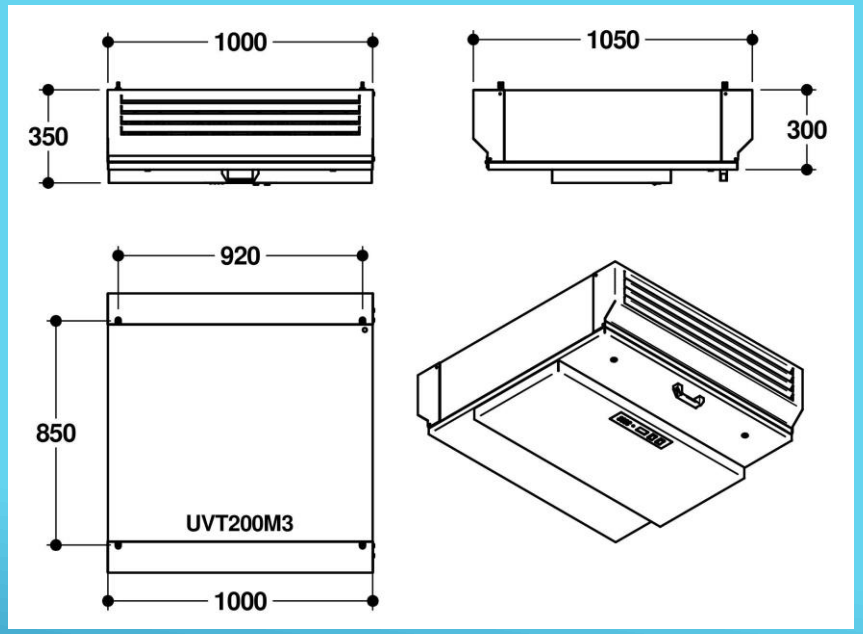
- The with nano-TiO_2 coated metal plates arranged inside the device are at right angles to the air flow and are positioned between pairs of UV lamps along the body of the device.
- The coating is a semiconductor and when light of a certain wavelength excites the surface of the titanium dioxide, electrons (e^-) are transferred from the valence band to the conduction band.
- At the same time, holes (h^+) are formed in the valence band.
- The holes oxidize strongly, while the electrons have a strong reducing effect.
- From the water arise highly reactive hydroxyl radicals ($\cdot OH$) and from the atmospheric oxygen reactive superoxide radicals ($\cdot O_2^-$).
- As a result, the pollutants are decomposed. Moreover, the ultraviolet rays change the DNA structure of microorganisms and cause their destruction. Pollutants and microorganisms will be mineralized into harmless end products such as water and carbon dioxide.

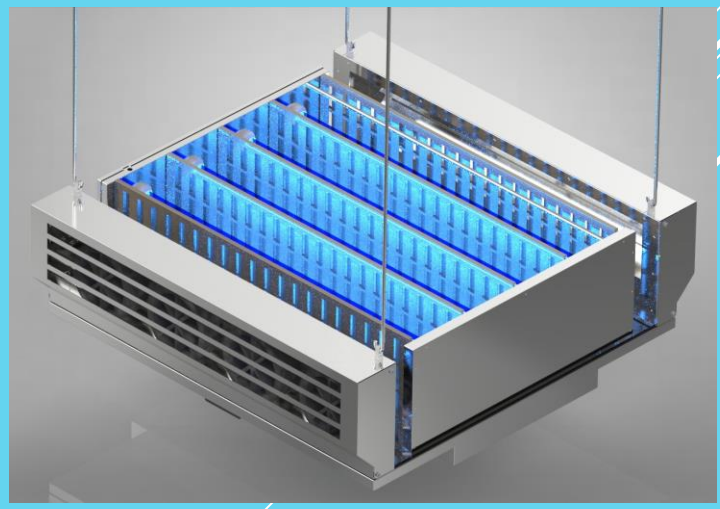
A "sectional view" about the degradation of the Volatile Organic Compounds:



Type of device:

Type	Colour	Size LxWxH (mm)	Max. air flow (m^3/h)	Supply voltage (V_{AC})	UVC lamps	Fans	Input elektric power (W)	Current flow (mA)	UVC output ($W_{253,7nm}$)	Safety device: Door contact switch
UVT 800M3	chromic	1050x1000x350	800	230/50	8x55W	4x25W	540	2300	8x19W	✓





Areas of use:

- **Indoor air treatment in closed rooms (industrial plants, fruit and vegetable storage, etc.)**

- **The device can be used wherever unpleasant odors and harmful organic compounds, mold spores, fungi, viruses and bacteria are to be eliminated. It is even used to cleanse pesticides from the fruits and vegetables we eat.**

Advantages of the device:

- **Synergistic effect of photooxidation and photocatalysis**

- **TiO_2 makes the UV more effektive**

- **There is no filter in the device**

- **Works without chemicals**

- Ozone free
- Low energy costs, programmable cycle times
- Rated average life of UVC lamps: 9000 hours (80% output performance)
- The house is made of stainless steel, no risk of corrosion
- Minimal maintenance effort
- Easy to install