Photocatalyst Technology:

MACTAIR PURE TECHNOLOGIES

A Proven Scientific Breakthrough

Milestones in Photocatalytic Innovation

The development of photocatalytic technology is rooted in decades of scientific discovery and global application.

- **1968** – Dr. Akira Fujishima of the University of Tokyo discovers the remarkable photocatalytic properties of titanium dioxide (TiO_2).
- **1972** – Publication of the *"Fujishima Effect"* launches worldwide research into photocatalytic oxidation and its potential to purify air and water.
- **1990** – The **First International Conference on TiO_2 Technology** is held in Toronto, Canada, focusing on its use for air and water purification.
- **2001** – **NASA** applies TiO_2 photocatalytic technology to neutralize microbial contamination risks following biological threats.
- **2002** – The **Taiwanese government** deploys TiO_2 photocatalytic systems to help contain the **SARS epidemic**.
- **2006–Present** – TiO_2 photocatalysis becomes a proven global tool to combat infectious diseases such as **SARS**, **Bird Flu**, and **COVID-19**, supporting safer air and surface environments worldwide.

Global Presence

TiO_2 photocatalytic technology is used extensively across the globe, including in:
Japan, USA, Canada, China, Hong Kong, Taiwan, Korea, Malaysia, Thailand, Singapore, Germany, Italy, and Greece.
Applications span from hospitals and schools to public transportation, offices, and hospitality venues—where cleaner air, safer surfaces, and healthier environments are essential.

Proven Applications

Air Purification

Photocatalytic oxidation actively decomposes volatile organic compounds (VOCs), nitrogen oxides (NOx), and other pollutants.
It continuously refreshes indoor air, reducing odors and harmful compounds while creating a cleaner, healthier environment.

Healthcare and Public Facilities

Hospitals, schools, transit systems, and offices use TiO_2 coatings and devices to continuously disinfect surfaces and air, reducing the spread of bacteria and viruses.

Everyday Protection
Photocatalytic surfaces can be applied to walls, furniture, handles, electronics, and shared touchpoints—providing ongoing antibacterial and antiviral protection.

Deodorization
Effectively removes odors from waste, pets, tobacco, and new materials such as carpets, adhesives, and automotive interiors.

Antibacterial and Antiviral Performance

Photocatalytic surfaces inactivate pathogens including **H1N1**, **H5N1**, **SARS**, **MRSA**, **MS2**, and **COVID-19**.
Microorganisms naturally carry a negative charge, while TiO_2 photocatalytic coatings carry a positive charge. This electrostatic attraction draws pathogens toward the surface, where they are destroyed through oxidation by hydroxyl radicals.
The result is **continuous, chemical-free disinfection** that is safe for people, surfaces, and the environment.

Safety of Titanium Dioxide (TiO_2)

Titanium is the **ninth most abundant element on Earth**, and titanium dioxide is recognized worldwide as **safe and non-toxic**.
It has been approved for use in **food, cosmetics, and pharmaceuticals**—commonly found in white chocolate, ice cream, and lipsticks.
As a photocatalyst, TiO_2 remains chemically stable and inert, **posing no risk to human health or the environment.**

Understanding VOCs (Volatile Organic Compounds)

VOCs are gases released from building materials, furnishings, fuels, and cleaning or personal care products.
Common VOCs such as **formaldehyde**, **benzene**, and **toluene** are found in paints, plywood, adhesives, and textiles.
Exposure can cause eye, nose, and throat irritation, dizziness, and respiratory problems.

Photocatalytic TiO_2 surfaces **break down VOCs into harmless carbon dioxide and water**, continuously improving indoor air quality and overall well-being.

A Safer, Cleaner Future

TiO_2 photocatalytic technology represents one of the most significant environmental health innovations of the past half-century.

Through continuous air and surface purification, it provides a **passive, reliable, and sustainable defense** against pathogens, pollutants, and odors—helping people everywhere breathe easier and live healthier.