



# Using the Power of Light to Clean

Advanced Material Technology That Reverses Environmental Damage



## *Using the power of light to clean air, art and architecture!*

**PURETi** manufactures a proprietary form of water and nano titania based spray products that transform virtually all material surfaces into self-cleaning, air scrubbers\*.

1. **Reverses Pollution** – by turning roads, bridges and buildings into smog busters
2. **Improves Health** – by purifying indoor air and creating bio-protective surfaces
3. **Saves Water, Energy and Cost** – by cutting cleaning cycles and time by >50%
4. **Optimizes Clean Technology** – by reducing de-rating due to soiling

**One application of PURETi lasts 5 to 10+ years, costs less than a paint job and delivers an ROI of 2 years or less!**

\*PURETi is not a cleaner. PURETi is a Keep-it-Cleaner. PURETi is applied to new or newly cleaned surfaces.

## Safe and Proven

**Photocatalytic titanium dioxide is a 45 year old, widely studied and proven technology for air and water purification:**

Over 9,000 patents and 34,000 published scientific articles

Over 30 international conferences on using PCO to treat air and water

**The PURETi breakthrough: putting this proven science in a water based spray that is safe, versatile and cost effective.**

**PURETi technology has been studied for its safety and efficacy by numerous universities and government agencies:**

NASA Dual Use Technology Partner.

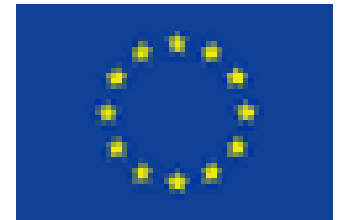
FDA\* Class II Medical Device Component

NSF International Registered Safe for Surfaces

EU SCCS\*\* Approved for Use

NIOSH – National Institute of Occupational Safety and Health

**Successfully applied to millions of square feet in US and Europe.**



## What It Looks When It's Working



**PURETi reduces exterior maintenance regimens by 50%, lowering energy and water use while improving solar reflectance of white surfaces.**

**PURETi prevented the accumulation of road grime on the treated interior squares of this white cement board panel during 6 months exposure.**

**PURETi windows are self-cleaning.**

**Washing is cut in half and twice as easy when done.**



**Significant difference after only 3 months on these solar panels.**



## What It Looks Like After 5 Years

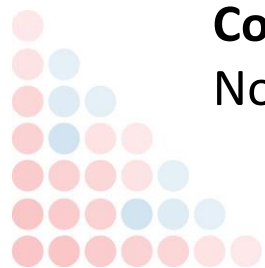
Los Angeles Community College – PURETi's 1<sup>st</sup> million sq. ft project  
Buildings PURETized in 2009 look great vs. buildings not treated



**Control** - Built in 2009. Not Treated.  
Not cleaned. Photo taken in 2013



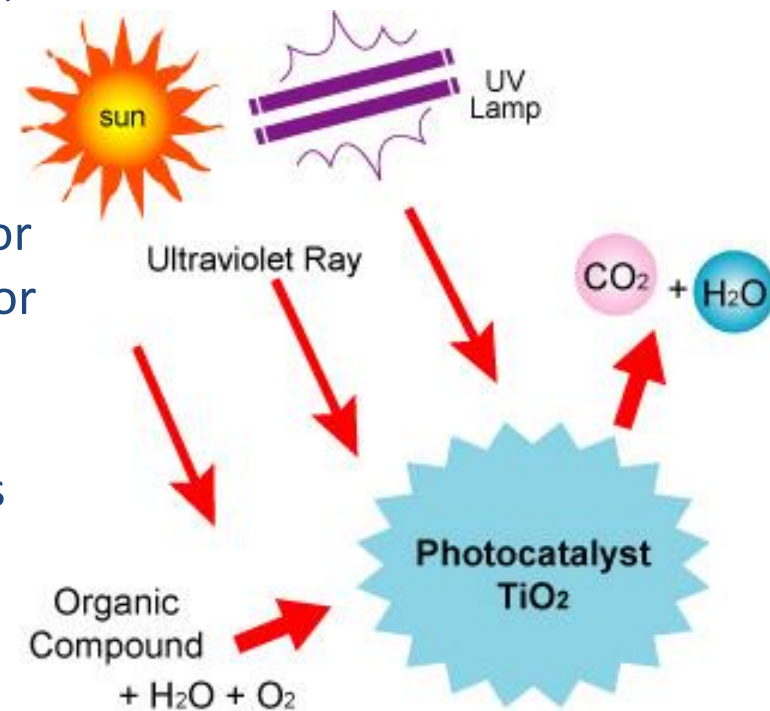
**PURETi** – Built in 2009. Treated.  
Never cleaned. Photo taken in 2013



## How PURETi Works

### Photocatalytic Oxidation – aka PCO - is the reversal of photosynthesis.

- In photosynthesis, light provides the energy for plants to create organic matter. All organic molecules contain carbon, hydrogen, oxygen and nitrogen; courtesy of photosynthesis.
- Photocatalysis is the light accelerated reversal of photosynthesis; a catalytic process that safely and instantly oxidizes or breaks up organic matter at the molecular level into water vapor and trace amounts of CO<sub>2</sub>.
- Titania or TiO<sub>2</sub> is the active ingredient. As a catalyst, it triggers the process and continues to work for years.
  - Life Cycle Analyses show PCO to be a tremendous net environmental good – removing NO<sub>x</sub>, methane and VOCs from the atmosphere and saving water and energy in reduced cleaning – far outweighing the CO<sub>2</sub> produced.



## How PURETi is Applied

**PURETi can be spray applied – in factory or field - to almost any existing surface**

- **It dries to form an invisible film – so clear it can be applied to glass**  
**...and it is extremely durable, cost effective, and sustainable**
- **One application on a vertical surface lasts at least 5 years**



**Applying on exterior glass**



**Applying to interiors**

## Where PURETi is Applied

### Everywhere to Reverse Pollution

PURETi treated surfaces work with light to purify air and eliminate:

- Volatile Organic Compounds (VOCs)
- Dust and Grime
- NO<sub>x</sub>
- PM<sub>2.5</sub> and PM<sub>10</sub>
- Odours
- Methane / Formaldehyde

### Exteriors – To Reduce Maintenance

PURETi treated windows, roofs and facades stay 2X as clean for 2X as long saving time, water and money.



### Interiors – To Improve IAQ

PURETi treated interiors eliminate odors and reduce VOCs and dust to improve IAQ and respiratory health



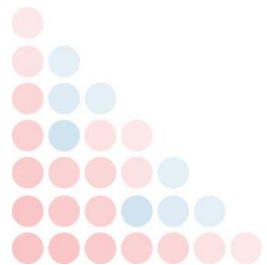
## Smog Eating Architecture



**Dives in Misericordia** (Rome)  
by US Architect Richard Meier.

Structure and sails were  
constructed using photo-active  
cement.

This was the first use of PCO  
technology by architects to  
reduce air pollution and  
preserve intended appearance.



## Transformative Architecture



### Wendy at MoMA PS1 (by US architects HWKN).

Wendy was the 2012 winner of the annual Young Architects Program (YAP) at MoMA PS1. It was an experiment to test how far the boundaries of architecture can expand to create ecological and social effect.

**PURETi** treated the nylon fabric to neutralize airborne pollutants.

During the Summer of 2012, **Wendy** reduced pollution to the annual equivalent of taking 260 cars off the road. **PURETi treated Wendy** was rebuilt in 2013 in Abu Dhabi Sustainability Week.

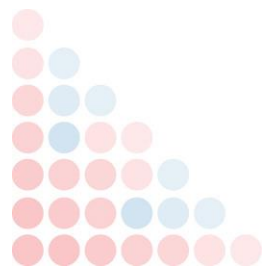
## Self-Cleaning Art



### Johnson Controls (JCI Milwaukee HQ)

This 1,400 piece acrylic mobile was designed by **Gensler** architects and installed 4 stories up in a well lit, but hard to access, corporate atrium. No plans were made for ongoing maintenance.

**PURETi** technology was applied in 2012 to improve IAQ and preserve intended appearance – dust free. Based on the success of **PURETi** on this project, the JCI Building Efficiency Group is now endorsing **PURETi** to all its key accounts.



# Self-Cleaning Art/Architecture

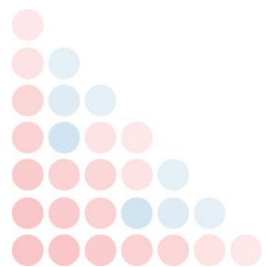


## Il Duomo (Milan)

**PURETi** PCO technology was applied to six areas – base, façade and roof - of the Duomo in late 2012.

The white travertine marble of this 13<sup>th</sup> Century Gothic cathedral had been recently cleaned and restored at great expense.

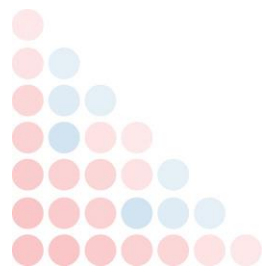
In November 2013, a year later, the supervising U. of Milan professor confirmed that **PURETi** is keeping the Duomo visibly cleaner and easier to clean as well. An interim report will be issued in early 2014.



# Awards



Winner 2012 -Material Science Award for Sustainability & Safety



# Partners and Projects

**Strategic Allies** - HOK / Johnson Controls / DTZ / Sun Chemical / Oldcastle / Hunter Douglas

## Commercial RE projects

Hines - Milano, NYC	2013/4	Building Exterior, IAQ
Johnson Controls, WI, Shanghai	2013/4	Building Exterior, IAQ
Vodafone, Milano	2013/4	Building Curtain Wall
EJM Properties, NYC	2013/4	Concrete Façade

## Education

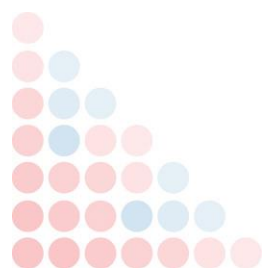
SUNY Westchester CC	2013	66,000sf brick facade
UC Merced Science Building	2011	86,000sf façade and windows
Los Angeles Community College	2007/9	1 million sf building exteriors

## Hospitality

Baha Mar, Bahamas	2014	Building Exterior, Guest Room IAQ
Armani Hotel, Milano	2013	Guest Room IAQ
Hilton Hotel, Barcelona	2013	Guest Room IAQ
Ritz Carlton Hotel, Buckhead, GA	2012	Guest Room IAQ
Resorts Casino Hotel, NJ	2011	Guest Rooms, Odor Elimination

## Public Venues

Il Duomo, Milan	2012	Exterior Façade and Roof - Marble
Sun Life Stadium, Miami	2013	Exterior Concrete
O2, London	2014	4,000,000 sf white architectural textile
Streets of Barcelona, Spain	2014	200,000sf pollution reversal study



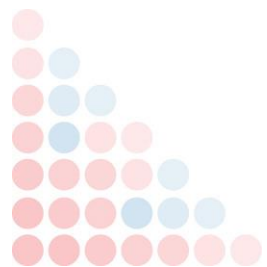
## BLUE Wave – BLUE Sky

### PIPELINE OPPORTUNITES

- Self-Cleaning Solar – PV panels, mirrors, thin film
- Printable Thin Film Solar – cost effective carrier ink
- Health Promoting IAQ – driven by portable TVOC sensor networks
- CAFO De-contamination – improving animal health and productivity
- SODIS – Solar Disinfection – low cost water purification
- Touch-less Disinfection – as part of an advanced smart coating system
- Sustainable Cities – NOx Neutral buildings, bridges and roads

### PING – PURETi Inorganic Nano Glue

- SWNCTs and other nano materials – durable, de-agglomerated, fixation
- Multi-layer adhesion promotion



# USING LIGHT TO CREATE HEALTHIER HUMAN HABITATS!

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