

Significant improvements in air quality in major cities in the Middle East were addressed by Cristal Global, with experts discussing the rising problem of pollution in the MENA region and utilising the power of the sun to remove hazardous Nitrogen Oxide from the urban environment

Air de-polluting technology

In advance of the Middle East Coatings Show (March 12-14, 2012) in Dubai, a team from Cristal Global gave a series of presentations to a handpicked audience of MEAI and wider Asian coatings manufacturers, formulators, specifiers and industry stakeholders.

The keynote of the afternoon was Cristal Global's commitment to enhancing the environmental health of the region and the globe, using its proprietary CristalACTIV product range as the cornerstone of an information programme offering validated solutions for air pollution.

Cristal Global executives focused on the positive environmental effects derived from the CristalACTIV photocatalytic TiO₂ range that can be added to a wide variety of products including paints and coatings, building materials such as concrete, glass and metals. The product drives a chemical reaction, powered by UV light from the sun that removes dangerous NO and NO₂ pollutants from the urban atmosphere and cause respiratory diseases such as asthma.

The audience was also very keen to hear about the long-term cost savings for CristalACTIV-treated products. In the current fiscal environment, the inherently self-cleaning nature of the photocatalytic process means that there is a long-term value proposition to any product that contains CristalACTIV photocatalytic TiO₂.

Mark Stoll, VP of Commercial at Cristal Global laid out Cristal's wish to be a global and regional leader. "We are trying to take a leadership role," explained Mark. "We are concerned about the problem but passionate about the solution. We need to change the way people think. We all need to drive behavioural change. This is as much about building a story as it is the 'sell'."

Cristal Global is at the forefront of this technology because of its leading role in the TiO₂ industry. With the largest foot-

print in the titanium world, Cristal is integrated across the titanium value chain. World class R&D has led development of new projects out of core TiO₂ products. As Stoll puts it, "Everything that is about our business is about titanium".

Cristal's product portfolio has led it to this new stage of development. Traditionally a TiO₂ pigment manufacturer, Stoll commented that Cristal was "moving from white to green". What started with white pigment is now developing into a range of environmental products designed to remove harmful pollutants from the atmosphere.

COLLABORATION COMMITMENT

Cristal believes that sustainability is about good business. Air pollution is everybody's problem. It's not going away. We all have a choice whether we want to act. Cristal is committed to working with partners to collaborate to make sure that a solution is found to what is a serious challenge to public health around the world. As Stoll concluded: "collaboration is vital".

Jean Francois Pasquier, global business manager Ultrafine and Specialty TiO₂, defined the challenge of air pollution. "Air pollution is a health issue. Its effects kill people all over the world through inhaling pollutants, which cause respiratory diseases."

However, much of the public debate is not over air pollution but the wider issue of climate change, to the point where they are in some cases seen as the same thing.

Pasquier hammered the point home. "Air pollution and climate change are not the same thing. Climate change will take decades and is a global issue. Air pollution is a local problem, killing people now."

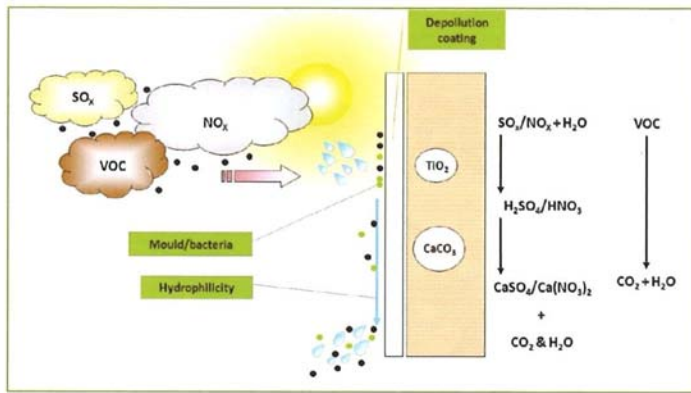
World Health Organization, WHO, statistics back up this assertion. With industrial growth and increasing levels of automobile ownership, NO and NO₂ levels are constantly rising. While the major solution has to be at source, CristalACTIV can provide a second line of defence, removing a significant proportion of the remaining pollutants from that atmosphere – thereby helping to improve public health in the urban environment.

Pasquier gave time to consider the growing concern in the Middle East. This is not just a problem for London, Berlin and Paris. Beirut, Cairo, Dubai are all showing signs of serious air pollution that is having a significant affect on public health. Air pollution is responsible for an estimated 850 deaths/yr in the UAE, according to a study commissioned by the Environment Agency in Abu Dhabi. In 2010, across the city of Beirut, the average concentration of nitrogen dioxide,



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NO_x, was 58µg/m³ of air. This exceeds the maximum average concentration recommended by the WHO: 40µg/m³.

Pasquier finished with a word of caution. "We have been working for over 30 years to control pollutants at their source but in spite of the increasingly strict controls, pollution continues to be a growing problem as more and more sources are put into play as the world's population continues to grow."

ENERGY FROM THE SUN

Brian Pickett, business director – Performance Chemicals, explained the chemistry behind CristalACTIV and some of the lesser-known capabilities of photocatalytic TiO₂.

The key is the sun. The sun is at the heart of the problem and at the heart of the solution. Pickett explained that: "It is the sun's energy that drives the smog cycle. At Cristal, we are now using ultrafine particles to reverse the equation and use the sun's energy to break down pollution."

This is a chemical reaction at the molecular level. The photocatalytic process occurs when the indicated substances come into contact with a treated surface. The combination of a tiny amount of water, sunlight and CristalACTIV breaks the molecular bonds of sulphur oxides, nitrogen oxides, VOCs and other substances.

Photocatalytic TiO₂, therefore, drives a chemical reaction that adds new functions to formulations in products such as coatings or building materials:

Depollution properties – Pollutants and VOCs are altered once they contact the surface, to form less harmful molecules.

Self-cleaning properties – The organic interface between the surface and the adsorbed species is broken down. The adsorbed species can then be more easily washed away by rinsing or rain – saving maintenance costs.

Deodorising – Toxic and unpleasant odours can be neutralised.
Anti bacterial – In a number of tests, CristalACTIV treated surfaces have shown a 99%+ reduction in bacteria and organic substances such as MRSA mould and mildew.

Pickett admitted that there are some downsides. "Yes, CA does produce CO₂ but so do human beings and other living organisms as they breathe."

"These materials have incredible potential to do a lot of good in the environment," concluded Pickett. "CristalACTIV is inherently self cleaning, thereby, lowering maintenance costs. It also deodorises and is anti bacterial, which offers interesting possibilities in the control of the spread of bacterial infections.

Enrico Geninazza, global marketing manager – Ultrafine TiO₂, elaborated on the practical applications of CristalACTIV. It is an active ingredient that can be used across a wide range of applications. Geninazza explained the inherent optionality of the product. When applied on to a surface, CristalACTIV Ultrafine TiO₂ makes it photoactive. The active ingredient can be incorporated into suitable formulations such as paints, coatings, mortars or applied directly on to a surface, using stable water-based dispersions of the CristalACTIV active ingredient.

CristalACTIV has been proven to work across a range of materials including cement, steel and glass. "There is a potentially massive opportunity in infrastructure industry."

CASE STUDIES

Geninazza also focused on two real world examples: In Manila, Philippines, a wall of a station was painted with CristalACTIV treated paint - a total area of 4100m². This resulted in a total of ~26g/100m²/day of NO_x removed. This single application removed the NO_x emissions of 7000 cars/day – or a total of 300kg/year of NO_x removed.

In London, working in partnership with King's College London, measurements of NO, NO₂, NO_x were taken every 15min adjacent to a CristalACTIV treated wall. The study showed that over two years, there was a significant reduction in NO_x. Extrapolating the figures, a 300m² façade coated with CristalACTIV material removes the NO_x emission of 50 cars travelling 20km/day. See case study below.

Geninazza concluded that due to current and prospective legislation, environmental health risks "would not be going away." There would be a fiscal cost to consider, that "fines were coming" and that CristalACTIV could be a solution. ■

The London Camden Trial

The trial ran for almost four years in the borough of Camden and aimed to deliver scientific fact as to the action of TiO₂ and the reductions in NO_x that this had. The wall, treated with CristalACTIV, was situated 25m from the roadside and was continuously monitored.

Trial Summary

- Background data taken from as far back as June 22, 2007
- Colloid applied March 16, 2009, surface area of 135m²
- Species of interest NO, NO₂ and NO_x
- Recordings taken of wind speed, direction, temperature and humidity
- Bloomsbury and Shaftsbury used as control/reference site
- Data interpretation using Six Sigma techniques

Trial Conclusions

- The trial data showed a significant reduction in pollution levels at the trial site after application of the product.
- Reductions were observed compared to previous years and

the reference sites

- Reductions are as large as 60% NO and 20% NO₂
- Greater reductions seen when NO_x levels are high
- There may be an activation period for this particular trial
- Reductions are seen both close to the wall and also at 1.5m away
- Product working during diurnal hours, which continues a few hours later due to the presence of reflected light and no activity observed during darkness
- Coating a larger surface area will result in higher reduction in pollution levels

