

DirectCure

UV CURING WITHOUT PHOTOINITIATORS



A significant disadvantage of conventional UV Curing is the mandatory use of photoinitiators. It is not uncommon that they migrate from the product, which can lead to major problems, especially in the food packaging industry. The **DirectCure technology** represents an innovative and cost-efficient alternative to electron beam curing (EB) and makes a **photoinitiator free UV** curing possible. In this process, the polymerization and crosslinking of acrylates are triggered directly by photons. The "chromophore" required for the formation of radicals is in this case the acrylate molecule itself.

ADVANTAGES

The **design and handling of the DirectCure are similar to conventional UV curing**. Therefore the curing of conventional coatings is possible without any configuration change.

This technology guarantees simultaneously high gloss crosslinking levels and a **better durability**.

Thus, the photoinitiator free curing is a **less expensive alternative** to electron beam curing.

Existing lamps can be easily replaced with DirectCure.

The **DirectCure technology can be combined with the excimer matting IOT EXCIRAD172 nm**.

ENVIRONMENTALLY FRIENDLY AND SAFE

- No photoinitiators and solvents, therefore minimal migration levels
- Complies with the statutory thresholds for food packaging according to EU-Regulation of 10/2011
- No extensive radiation shield necessary compared to the electron beam curing

APPLICATIONS

DirectCure is ideal for products with high ecological claims:

- Furniture
- Flooring
- Foils
- Food packaging

AWARD-WINNING & PATENTED

With the **DirectCure** technology, IOT won the price "IQ Innovationspreis Mitteldeutschland 2014"



DirectCure radiator and electric cabinet

IOT Service

WE SUPPORT YOU

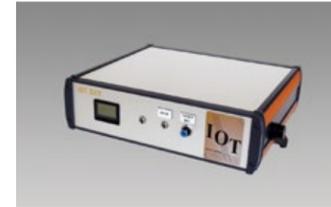
In order to test our products within your production environment and to become familiar with the system, we offer an assortment of different rental equipment with nitrogen inerting:



rental systems
175 mm – 2320 mm



ExciTrack
VUV Dosimeter for throughput
Simple data analysis on PC via USB-connection



IOT-Oxy
Portable oxygen analyzer

- Full Service – from the first preliminary tests to production
- Worldwide sales of standard solutions for the activation, matting and hardening of surfaces
- Optional retrofitting of already existing production equipment with the IOT technology, or construction of a complete new system (on conveyor belt or roller)
- Very high standard of technology due to many years of experience in conception and construction of equipment
- Test without obligation prior to the realization in our own laboratory, thereby testing and optimization of the interaction of coating formulation, substrate, Excirad-lamps and UV dryer with your materials
- Rental of stand-alone equipment for testing IOT components at your company



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EXCIRAD 172 SUPER MATT SURFACES

DirectCure UV CURING WITHOUT PHOTOINITIATORS

Photon Activation ACTIVATION AND CLEANING

UV Inert UV CURING UNDER NITROGEN



PRODUCED WITH EXCIRAD 172

EXCIRAD 172

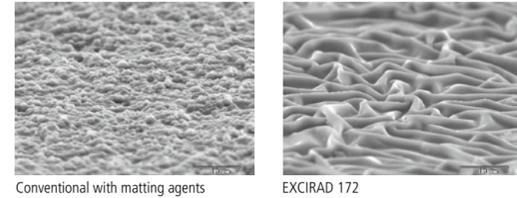
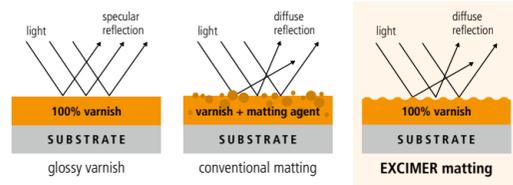
SUPER MATT SURFACES



With the **EXCIRAD** super matt surfaces can be produced **without matting agents**. The 172 nanometer radiation forms a fine microstructure on the surface of the still uncured coating layer. Afterwards it will be dried by DirectCure lamps or conventional drying methods such as **UV Hg lamps, LED** or **electron beams** are used for this purpose. The wavy surface generated on the substrate spreads the incoming light – **The surface appears matt.**

ADVANTAGES

The **mechanical and chemical resistance is increased** due to the additional activation of carbonyl groups for crosslinking. This is also possible for post irradiation of glossy surfaces. An additional advantage is the **improvement of the diffusion barrier** and there is no need for **photoinitiators**, the polymer matrix is not disturbed by matting agents.



BEST OPTIC

- Super matt surfaces for gloss levels between 1 and 20
- Minimal gloss deviation below level of 0.5
- Folding textures can be adjusted from super fine to very coarse

BEST HAPTIC

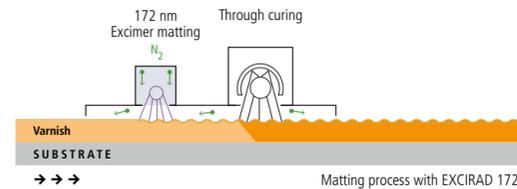
- Smooth folding textures instead of sandpaper-like matting agent
- Unique soft-touch effects are possible

APPLICATION

The matting of coatings by excimer can be done on all surfaces such as wood, stone, metal, decorative paper and stamping foils as well as laminate films for floor coverings, on furniture and in the automotive industry. The integration of the **EXCIRAD 172** into existing systems is possible without difficulty.

ENERGY EFFICIENCY

- Very low energy consumption of only 25 W/cm, as only the required wavelength is generated
- Genuine “cold” lamps, so that there is no thermal stress to the substrates
- Output power continuously adjustable
- No standby-power consumption, since there is no warm up necessary
- Fast switching between matt and gloss products possible



TECHNICAL SPECIFICATIONS

Irradiation width 100 – 2.700 mm freely selectable → **Wavelengths** 172 nm or 222 nm → **Lamp power** 5 – 25 W/cm → **Dose rate** 10 – 30 mW/cm² → **Production speeds** up to 100 m/min per lamp → **Higher web speeds** with multiple emitters possible → **Cassette insertion system** for quick and easy lamp replacement → **Easy connection** of the products by quick couplings

UV Inert

UV CURING UNDER NITROGEN

UV curing in atmospheric air always implies presence of oxygen in the process chamber. But the oxygen inhibits the curing (polymerization) of the coating and thus reduces significantly the efficiency of the drying process. By purging the processing chambers with the inert gas nitrogen, oxygen can be almost entirely removed (down to 0,003 % / 30 ppm). **UV lamps can be operated with a reduced power, while simultaneously improving the surface quality.**

ADVANTAGES

The **production rate** can be increased while maintaining the same lamp power. Alternatively, the lamp power can be reduced to one third while maintaining the same production rate. The material has a **higher scratch and chemical resistance**. A superior curing is achieved with problematic colours like opaque white. The reduction of photoinitiators lead to a **reduction of odors and in the tendency to yellow**. The reduction of **global migration** is particularly important in the food industry. The IOT UV inerting systems **can be combined with all UV dryers** and integrated or retrofitted into existing systems on request.

EFFICIENT AND SAFE

- Low nitrogen consumption by optimizing the inerting chamber
- CFD optimized nozzle system
- Safe production process because of continuous residual oxygen measurements and control
- Contact-free passage of the substrate for food applications
- Simple system operation and monitoring via touchpad
- Compact chamber design



The slide-in system allows a quick replacement or cleaning of the quartz plate.

Inert chamber with EXCIRAD 172 and UV lamps on conveyor belt



APPLICATIONS

- Printing and coating industry, for example for flexo, screen, offset and digital printing
- Furniture coverings
- Labels
- Floor laminate, PVC and non-PVC floorings
- Facade elements
- High speed roll-to-roll processes, straight pass and on cooling roller
- Siliconization

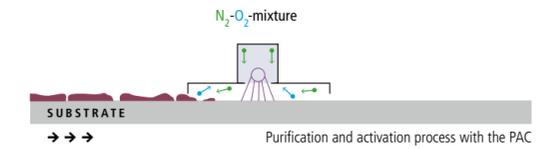
Photon Activation

ACTIVATION AND CLEANING

Many materials have a too low surface energy to print them or stick them together. The **Photon Activation Chamber (PAC)** represents the new alternative to the conventional **corona or plasma treatment**. With a VUV-ozone treatment the **organic impurities**, which would otherwise act as a separation layer, were removed. The specific UV radiation generates additional polar groups that lead to a sustained increase in the **polar surface energy**. The results are a **uniform coating** and an **optimum adhesion**.

ADVANTAGES

Since this is a cold process, in which there is virtually **no heat input**, it is also suitable for heat sensitive materials such as plastics, and thin foils. The low penetration depth of the UV radiation **prevents any damage** to the deeper layers of the material. The effect is **maintained for months** because no volatile molecular fragments are formed.

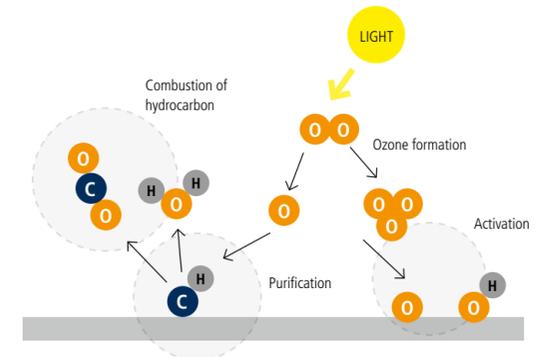


BACKGROUND

With the “**Photon Activation Chamber**” bonds in polymers are broken up. They react with ozone and oxygen radicals, which are formed from the ambient air oxygen by the irradiation. In order to achieve high production speeds, as required for example in the printing industry, the oxygen content in the treatment chamber will be adjusted accordingly.

AT A GLANCE

- Irradiation also of 3D shapes
- UV alternative to corona treatment
- No back-side effect



Tapetest
No adhesion on untreated surface



Poor adhesion with surface damaged by corona



Optimal adhesion after PAC treatment



Treated area with higher surface energy



Untreated area with low surface energy