# The excimer coatings

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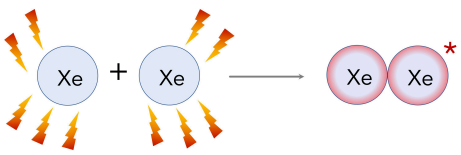
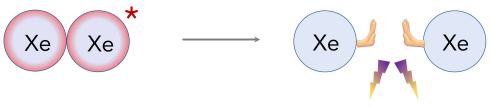
In the wide scenario of the coating materials for furniture surfaces, the last significant technological evolution can be considered that of excimers. Although known to operators in the sector, above all for the performance that the surfaces treated in this way can offer, the theoretical principles on which it is based are probably a little more elusive also due to a certain complexity that actually involves this new technology.
However, there is no doubt that a basic knowledge, even if not particularly thorough, is often essential to understand its potential, to deduce its limits but also to deal with any problems that can always arise when using new materials or new technologies.
In these brief notes we would like to briefly consider what excimer coatings precisely are to offer a small contribution of knowledge to those who are already using them or in any case to those who wish to have some more information on the general principles and practical aspects of this technology.

**So, what are excimers?**
Let's start from the word excimer which derives from the union of the two English terms "excited" and "dimer".
To understand what it is about, we must necessarily introduce some chemistry concepts hoping that this brief introduction does not immediately scare away the readers of this article. In very simplified terms we can begin this preamble by recalling that the vast majority of known chemical elements have a great affinity and ability to bind together to form molecules. For example, oxygen and hydrogen atoms stick together to form water molecules, and so do almost all other atoms.
However, some gases such as Neon or Argon are an exception to this atomic "sociality", which do not show any tendency to bond with other atomic species. Precisely for this reason these elements are called "noble" as they have no tendency to mix and unite with the other atoms of the periodic table.
However, this "asociality" of such elements can be circumvented by acting under certain special conditions. When these gases, concentrated in delimited spaces, are in fact subjected to very strong electric discharges, it is possible to make their atoms bind in pairs for a very brief period of time. These species, formed precisely by two (di-) parts (meros) however have a very short life in the order of nanoseconds (a nanosecond is one million of a second). The almost immediate dissociation of these dimers brings the individual atoms of the noble gases back to their "isolated" condition causing, in this sort of mutual rejection, the emission of very high-energy radiation in the ultraviolet C range. Excimer lamps are therefore made in this way, they use noble gases (also in combination with other elements) capable of emitting very high energy electromagnetic radiation and often being, contrary to other lamps commonly used in the coating processes, practically free of other collateral radiations in the infrared or in the visible ranges.




Formation of dimers due to electrical discharges




Dissociation of dimers with emission of very high-energy

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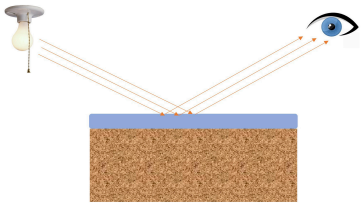
**What are excimer lamps used for?**

The very high energy produced by excimer lamps is able to produce very important effects with the substances or surfaces with which it comes into contact, being able to even modify their chemical composition.

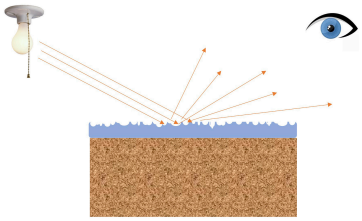
One of the most common applications is the cleaning and sanitizing of surfaces which take advantage by the combined effect of the molecular degradation of the polluting particles caused by the high energy of the UV radiation and the oxidative effect induced by the ozone that these lamps always produce in presence of oxygen.

Other applications concern the activation of surfaces or their oxidation without entering other fields such as the medical one where these sources are used for very specific applications.



Light bouncing off a smooth surface produces a feeling of brilliance

matting additives migrate towards the surface producing micro-roughness



Superficial roughness scatters light rays in different directions, producing matt sensation

**The application in the coating of panels**

In the panel coating sector, excimer lamps have found an interesting application by integrating into systems that use photo-curable coating (UV coatings).

Excimer lamps are in fact used to produce very matt (low gloss) surfaces without the need to add matting additives to the formulation of liquid coatings.

In traditional products, in fact, these additives which have the form of tiny particles insoluble in the liquid coatings, tend to migrate towards the surface during drying, producing a sort of superficial micro-roughness. The light rays, when they bounce off a surface made in this way, are scattered in all directions, producing the matt sensation to our eyes.

In the case of excimer systems, after an initial gelling of the coating (partial hardening) induced by traditional UV lamps, the surface passes under the excimer lamps which produce a sort of surface wrinkling. In the last phase of the drying process, the coated surface is irradiated again by the traditional UV lamps which complete its hardening.

The wrinkling induced by the excimer lamps therefore produces very matt surfaces and the high energy that strikes the coating also induces a very high surface hardness.

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**The potential advantages and possible disadvantages of excimer technology**

The most appreciated advantage of excimer coatings is the possibility of producing very low gloss surfaces, the so-called “zero gloss” to which today’s market is very sensitive.

These low matt surfaces are also very stable to the effect of wear that traditional products suffer much more. The simple cleaning of a surface can in fact remove or smooth out the matting agents that have produced the surface micro-roughness, causing it to polish with the formation of unsightly patches of varying surface gloss.

In the case of excimer coatings this does not happen also thanks to their very high hardness, much greater than that of any other traditional coating material. The tests to investigate the scratch resistance and the resistance to the contact with liquid substances show, normally, very good results.

On the other hand, other properties deserve more attention, such as the resistance to dirt. The dirt particles can in fact deeply penetrate the previously mentioned micro-roughness of the surface with a certain difficulty in subsequent removal attempts (cleaning). Even the color change should be considered, especially in the case of white surfaces, as it is subject to particular dynamics with possible evidence of yellowing in dark conditions which, in some cases, can also show a sort of subsequent reversibility. These effects are already known for some traditional UV coatings and have already been the subject of specific studies carried out by Catas.

At the plant level there are no particular problems related to this technology which must in any case be associated with UV systems, except that of necessarily having to remove the oxygen from the area where the excimer lamps operate. As previously mentioned, these lamps induce the formation of ozone in the presence of oxygen molecules. The plants must therefore operate in an inert atmosphere with flows of nitrogen generated by suitable systems or in any case stored in special tanks.

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