



ELECTROCHROMIC GLASS

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ABSTRACT

Today, we see people walking down the street with sunglasses everywhere. These people use sunglasses well, because they are comfortable and make a personal style, other people is because you need to wear them. These last people either having blue eyes, green colored (clear) are more exposed to sunlight and thus have a light sensitivity in much higher than people with dark eyes.



Picture 1: Difference between dark eyes and light eyes. (Original picture in 1)

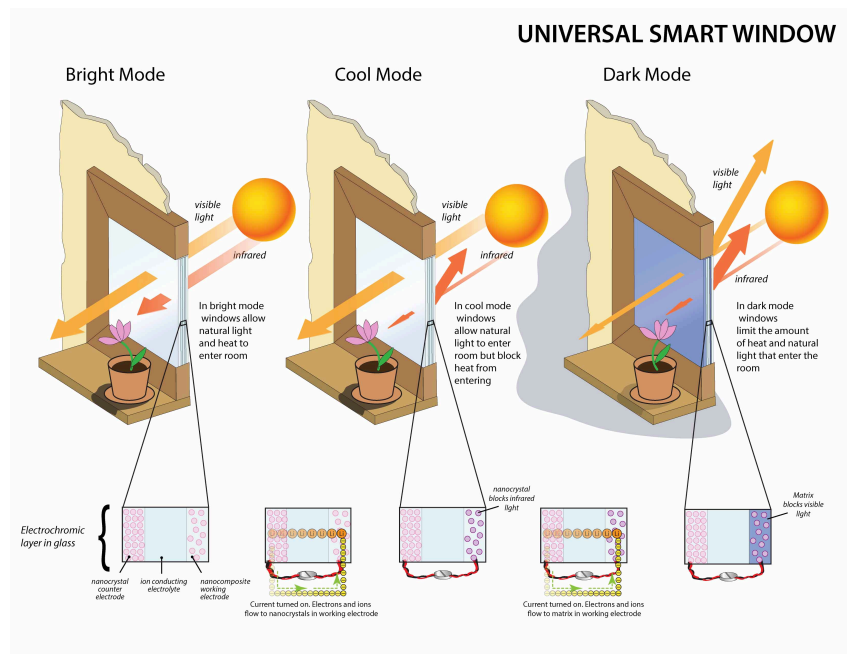
Photophobia description: Photophobia the term is used to describe photophobia eye sensitivity to light. Sunlight, indoor lighting and street lighting can potentially cause eye discomfort or pain. Certain common drugs like antihistamines, birth control pills and antibiotics have ocular effects produced photophobia (see labels). This is usually because the drugs produce dilation or increased pupil size. Photophobia may occur when an irritation or eye infection, or presents, may be due to a lot of diseases that affect vision: recent eye surgeries, albinism, migraines and a lot of visual problems affecting the surface of the eye or retina. The retina is the light sensitive located on the back of the eye and is responsible for processing the images tissue. Treating photophobia, usually simply involves treating the underlying cause. There are rare cases in which congenital illnesses or medications can cause sensitivity to light and produce photophobia.

INTRODUCTION

Electrochromic devices change light transmission properties in response to stress and thus allow control over the amount of light and heat passing through it. In electrochromic crystals, the electrochromic material changes its opacity: it changes between a colored translucent state (usually blue) and a transparent state. A burst of electricity is required for changing its opacity, but once the change has been made, no electricity is needed for maintaining the particular shade is reached. Darkening occurs from the edges, moving inward, and is a slow process, ranging from many seconds to several minutes, depending on the window size. Electrochromic glass provides visibility even in the darkened state and thus preserves visible contact with the outside environment. It has been used in small-scale applications such as rearview mirrors. Electrochromic technology also finds use in indoor applications, for the protection of objects under glass glasses, crystals museum and picture frame glass from the damaging effects of UV and visible wavelengths of light artificial.

The need to protect the eyes from UV light, it is planted to the development of a nanocrystal to be able to vary their opacity thus allowing the regulation of light received in the eye. With this technology we can prevent from bursts of light that can be annoying, to serious problems due to the failure to protect the eyes when these are in very bright environments.

One form of to see the work of this glass is related in the next picture.



Picture 2: Nanoglass work (Original picture in

LITERATURE REVIEW

Certainly the optimum solution for the treatment of the entrance of daylight in buildings is windows and glass facades that allow regulate light and heat that enters . Materials with this function are generally known as " chromogenic " . The optical change may be in different materials, and thus the rephotochromic materials , thermochromic , electrochromic and gasocrómicos (EC) , among others. EC materials are easily controlled by the user, by electric voltage, and therefore have the wide range of possible applications.

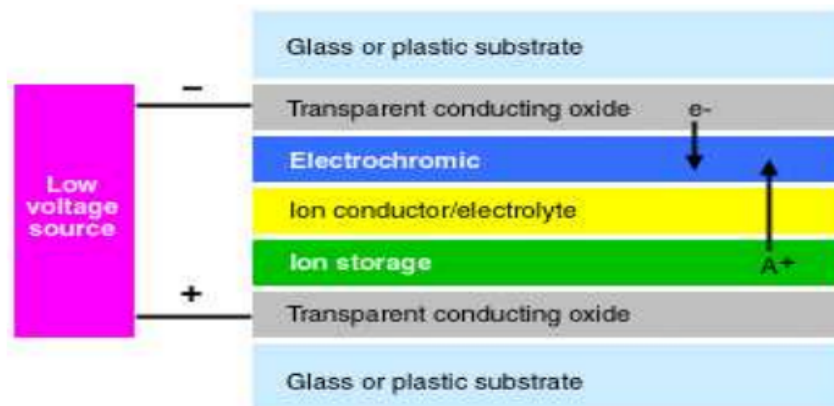
EC materials have been known for over 30 years and have recently gained much attention due to the large number of applications , even in marginal areas . Some of them are used as anti-glare rearview mirrors , smart windows in vehicles and buildings , sunglasses , information panels, indicators of temperature and optical filters. Of these, two are already being marketed . One is used as mirrors, which is leading manufacturer Gentex Corporation (USA) .

These can also be used as smart windows or EC, which reduce the intensity of outside light entering the room , achieving lower part of the heat input from the outside, and increase the privacy of the room or the vehicle and reduce energy consumption air conditioning. Fig . 16. Layers forming an electrochromic device (Ref . Rosseinski DR , RJ Mortimer , Adv . Mater . 13 (2001) 783) .

An electrochromic device generally consists of several packaged between two substrates as shown in Fig 16 layers. The substrates are typically glass, but sometimes they are plastic. On them a layer of ITO is deposited transparent conductive material serving as a contact . The EC material is then deposited. Then an ion conductor (electrolyte solution or solid electrolyte) is needed.

After complete with the counter electrode, a layer consisting of a material capable of intercalating ions (conductive polymer , metal oxide ...) deposited on the conducting glass support (glass ITO layer) . EC materials exhibit a reversible change in their optical properties when electrochemically oxidized or reduced . Many materials , both organic and inorganic nature , exhibit electrochromism . They include inorganic metal oxides (WO_3 , V_2O_5 , MoO_3 ...)

WO_3 being the most extensively studied. Their electrochromic properties were discovered by Deb in 1969. The mechanism that produces the coloring WO_3 described by



Picture 3: Glass material structure (Original picture in 3)

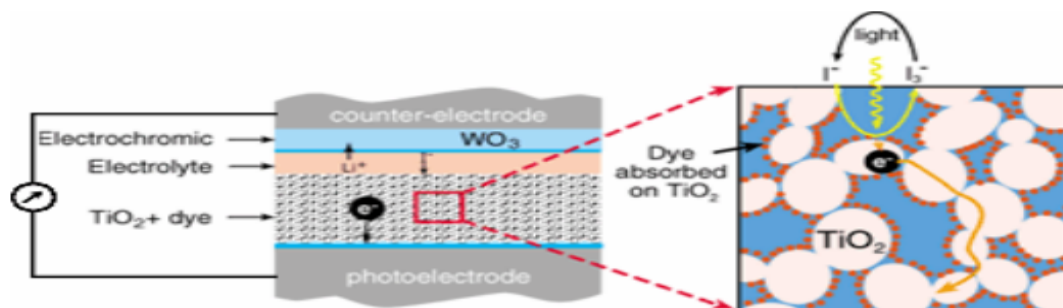
WORKING

An electrochromic device generally consists of several packaged between two substrates as shown in Fig 16 layers. The substrates are typically glass, but sometimes they are plastic. On them a layer of ITO is deposited transparent conductive material serving as a contact. The EC material is then deposited. Then an ion conductor (electrolyte solution or solid electrolyte) is needed. After complete with the counter electrode, a layer consisting of a material capable of intercalating ions (conductive polymer, metal oxide ...) deposited on the conducting glass support (glass ITO layer). EC materials exhibit a reversible change in their optical properties when electrochemically oxidized or reduced. Many materials, both organic and inorganic nature, exhibit electrochromism. They include inorganic metal oxides (WO_3 , V_2O_5 , MoO_3 ...), the WO_3 being the most extensively studied. Their electrochromic properties were discovered by Deb in 1969. The mechanism that produces the coloring WO_3 described by

Here M^+ is a metal cation (typically Li^+), or H^+ proton, which is inserted into the WO_3 network when it is reduced by an applied external voltage. This process produces several changes in the UV-visible spectrum of WO_3 . Within the EC organic materials are conductive polymers such as polyaniline and poly (3,4-ethylenedioxythiophene), among others. The viologen are organic compounds to be reduced pass from colorless to intense blue or green color. dications are 4,4'-disubstituted 1,1'-bipyridine. The first reduction is highly reversible and leads to the formation of the colored radical cation. In EC devices, orviologen may be dissolved in solution or adsorbed on the electrode surface as a nanoporous TiO_2 . These molecules have a

high charge transfer rate with nanoporous electrode, increasing the speed of the discoloration over other types of devices ¹³. Furthermore, because the nanocrystalline nature of the electrode, which provides a large working area, the optical phenomenon is amplified 2 or 3 orders of magnitude. This technology was discovered by Michael Grätzel and Donald Fitzmaurice in early 1990. The multinational Tera has acquired the rights of exploitation and announced its next major development for high-definition electronic displays .

The electrochromism is being made in products such as displays, ceiling mirrors and luxury cars, like the Ferrari Super America , 550 cars limited model, which takes an electrochromic roof. But " smart windows " for buildings have not been performed to great escala.¹⁰ Many companies compete to find solutions to make smart , controllable window with a switch or sensor, at a reasonable cost . But many of these developments are inaccessible as companies seek unique solutions . Also been proposed self - powered , smart windows EC layer composed of a solar cell integrated that can keep all layers very thin , so that they are transparent . The transmittance of the device decreases when illuminated and may increase in short – circuit conditions . Therefore , no external voltage source coloring or bleaching the fotoelectrocrómico device.



CONCLUSION

Now you see it , now you do not ! Do you ever have one of ESOs days when the sun does not know if he 's coming or going , leading one to keep putting his sunglasses so you can read the words on the computer screen or leave your furniture bleaching ? There will be a long time before we all consign that particular problem , history , thanks to the arrival of electrochromic glass ("intelligent" glass) , which changes from light to dark (transparent to opaque) and vice versa , with just the nustos current that can cause eye , they can change the state of light in the iris , so that affects us less ambient light . It is wonderfully convenient (more faded upholstery sin !) Relatively simple, and has huge environmental benefits .

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