Being Green and Informative with 3G Switchable Film

There are many kinds of window films available in the market for different functions, from solar heat reduction to heat retention, UV protection to glare reduction, privacy to security, projectable to switchable, decoration to information, energy saving to diffusing, touch screen to 3D effect. Since in general only one layer of film can be applied on a window, we may utilize one or a few of aforementioned functions. For years, it's been a dream to have a window film for people to enjoy more benefits from different functions. Now this dream becomes true with cutting-edge NPD-LCD™ technology and multi-functional 3G Switchable Film™. Incredibly, it has all functions mentioned above! A high standard of achievement is bringing a benefit to our life without sacrificing other living standards. To be green or save energy, we have to consider overall efficiency in an application and avoid a situation in which we take one advantage in one way, but lose some benefits in other way. Here is why 3G Switchable Film for green and informative buildings.

As we know, ultraviolet rays are harmful to the skin and can fade interior colors, while infrared rays transfer heat from the sun. Three types of window films in the market are used to block UV and infrared light. They are dye- and pigment-containing window film, metallic coating window film and ceramic coating window film. Dye and pigment type is dark film and has an absorptive function to block UV and infrared, but it also blocks over 90% of useful visible light and results a discoloration. If this type of film is applied in inside of a window, it cannot save much energy, because absorbed heat on window needs air-conditioning power to cool down. Blocking visible light may increase use of artificial lighting. 3G Switchable Film uses non-linear technology and nanotechnology to block UV and infrared while allowing full spectrum of visible light to transmit. Full nature light without discoloration not only meets human's comfortable levels, but also allows indoor plants to grow normally.

Metallic coating window film is able to reflect all wavelength of sunlight. It usually has mirror like appearance. The reflection has no selectivity. When blocking 60% of infrared, it also blocks over 80% of visible light. This film does not allow seeing through from bright side to dark side. It may provide privacy at day time from inside. However, this function can be problematic at night for home security, when outside people can see inside, while people inside cannot see outside. Some governments and communities restrict use of windows films with strong mirror reflection. Some people do not feel comfortable being surrounded with mirrors in home at night. 3G Switchable Film can be switched between clear and opaque. In any light condition, vision ability is equal in both sides. Privacy function is totally controlled by user.

Like ceramic type of window film, 3G Switchable Film consists of nanometer-sized coating. With a non-linear optic system and silicone- and fluorine-containing polymers, it is capable to revolutionarily make light travel in curved way inside of the film and selectively control nature light to pass, UV and infrared to reflect. As shown in both optical measurements and sunlight test, 3G Film can block 100% of UV and 70% of sun's infrared ray, while allowing most nature light to pass.

To reduce building energy consumption, we have to emphasize overall efficiency and controllability, because energy saving is not depended in one situation. Sometime, our effort for saving energy in one situation is draw backed by other situation. For example, absorptive or reflective window films block over 80% nature light while blocking infrared, causing more energy consumptions due to artificial lighting. However, diffused light from 3G Switchable Film can reduce use of artificial lighting. A reflective window film may reject sun's heat gain in summer, but it will also block sun heat in winter and then causes more energy consumption from heater. 3G Switchable Film can efficiently handle both situations with its switching capability. It may reject summer sunlight heat in scattering mode and allow sunlight heat to admit in winter in clear mode. During a winter night, it can retain inside heat from escaping in scattering mode. Since opacity of 3G Switchable Film can be gradually changed by different voltages from totally clear to completely opaque, a computer can automatically control opacity of window and ceiling lighting to minimize energy use for all seasons. Therefore, overall high efficiency in energy saving can be achieved with its great controllability.

Light Type	Transmitted Light Intensity (%)							
	Window Film A Dye and Pigment Type Claimed 59% heat rejection		**Window Film B** Metallic Costing Type Claimed 70% heat rejection		**Window Film C** Ceramic Coating Type Claimed 79% heat rejection		**3G Switchable Film** Liquid Crystal Type About 70% heat rejection	
	Film	**Film on Glass**	**Film**	**Film on Glass**	**Film**	**Film on Glass**	**Film on Glass Power off**	**Film on Glass Power on**
UV	0	0	11.5	9.2	0	0	0	32.9
Vis	3.8	3.1	26.1	24.2	18.2	16.5	0.1	69.7
RI	21.0	19.2	17.7	17.0	12.2	10.8	8.7	79.0
Appearance	Black	Black	Semi-mirror	Semi-mirror	Mirror	Mirror	Opaque	Clear

3G Switchable Film has best functions in projection and privacy. Projected images can be seen from both sides at any angle. With helps of non-linear optical system, projection brightness can be amazingly retained at any viewing angles. When a building is covered with 3G Film and projected at evening, the entire building wall becomes a projection screen. In daytime, people inside a building may enjoy nature light and privacy while saving energy. This application cannot be replaced with LED or other technologies, because large LED billboard on building must block windows and affect value of building space. Using 3G Film only has 10% of LED cost and 1% of LED power consumption and advantages of switchable, privacy and light diffusion for people in the building. Advertising is a net benefit brought to the building, and building space does not lose its value. Actually with this application, building walls could be more valuable than regular billboards. 3G Film pays for itself by advertising in a couple of months. Since 3G Film has both front and rear projections and VAI (viewing-angle-independent) brightness features, a single industry projector can do the job to present great images for viewing from any angle on a street. It is not necessary to do advertising at all night. After midnight, some still images of beautiful pictures or pattern designs can be shown on the building. The building as whole becomes a changeable model, bring cultural flavor to people and decorating the city. This application is strongly supported with great features of 3G Switchable Film, including best optical properties, low driving voltage, great stability for moisture, heat and UV, all weather application from -30 ºC to 80 ºC, water-proof, front and rear projections, VAI brightness, self-installation with DayLightCure™ glue, super diffusion, full ability for touch screen, energy saving and long life time. The application enriches wall's connotation and function as well as its value. Since 3G Film has same thickness (0.38mm) of security film, it also enhances security to windows. Laminated 3G Switchable Glass has most strength of bullet-proof glass. For similar purposes, 3G Switchable Film has widely used everywhere, including entirely covered cruise ships in United Arab Emirates, many high speed trains in China and Germany, airplanes in US and France and countless number of cars and recreation vehicles everywhere in the world and 24 major airports in China. So, being green and informative with 3G Switchable Film!

Comparison of sunlight thermal test between window film B and 3G Switchable Film

This experiment uses two isolated and sealed thermal chambers covered with a window film on glass and 3G Film on glass separately. The result shows that both temperature raising speed and the highest temperature in 3G Film chamber (right) are same as those in left chamber covered with popular window film sold in Home Depot with claim 70% of sun heat rejection.